

Archives of
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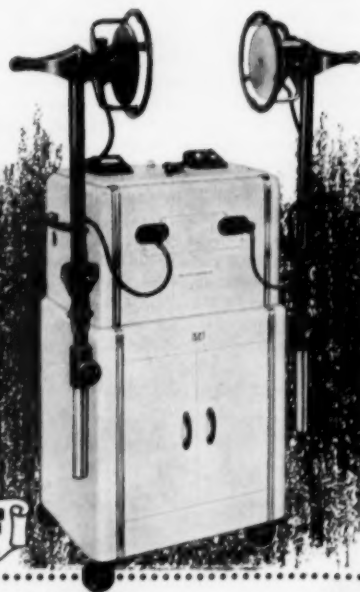
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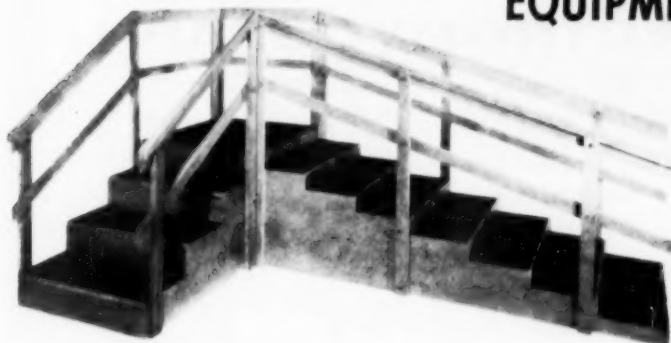
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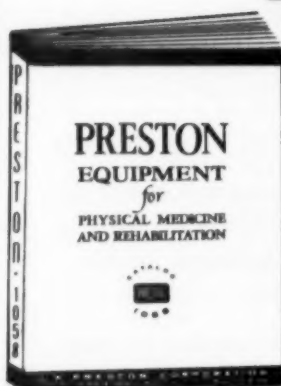
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Concept of Motivation in Physical Medicine

Franklin C. Shontz, Ph.D.
Cleveland

Perhaps the most overused and least understood psychological term in the field of rehabilitation is the word "motivation." A popular concept, it has attracted the attention of medical personnel and has been used to explain psychological phenomena of many types. In some ways, this is a most favorable sign, since it indicates a growing acceptance of the importance of psychological factors in the rehabilitation process. However, it is also a potentially dangerous sign, since it suggests the growth of certain misconceptions which may be difficult to clear up should they become too firmly established in common medical usage.

To the psychologist there appears to be a parallel between the current status of the concept of motivation in physical medicine and the status of the concept of intelligence in the field of education some fifty years ago.¹ There is certainly as much need felt now for the measurement of the one as there was then for the objective evaluation of the other; yet, the psychologist's experience with the development of intelligence tests warns of certain dangers inherent in attempting to fit objective measuring instruments to incompletely worked out theoretical ideas. For example, tests originally designed to measure "general intelligence" are now recognized to be primarily predictive indices of scholastic achievement, and the consistent failure to demonstrate high levels of correlation between all forms of human physical and psychological capacity has led to virtual rejection of the notion that any single test can predict ability to perform in all possible areas of intellectual accomplishment.^{1, 2}

Careful observation of patients with chronic physical illnesses suggests that a similar situation exists with respect to the concept "motivation." For, while it is conceivable that one may devise empirically valid predictive measures of success in specific aspects of rehabilita-

tion, it is very doubtful that any global or general motivational factor as such can ever be expected to appear. Still, a strong tendency exists among those without extensive formal training in psychology to think of motivation as a unitary force or as a sort of "mass" which may be present in patients to varying degrees (or, as the statistician might say, "on a monotonic scale"). Like a pile of uniform bricks that may be counted and compared to the calculated requirements for the construction of an outdoor barbecue pit, it is often supposed that all one needs to know is whether a given patient possesses a sufficient number of "motivational units" to meet the requirements of rehabilitation. That this is not the actual case, however, may be easily demonstrated through the presentation and analysis of some illustrative case material.

Case Material

Patient 1. D. G. is a 46-year-old male quadriplegic who has been a constant source of difficulty on the ward. A passive-aggressive person, he complains that he is receiving poor service and insufficient attention to his personal difficulties. He gains little from his sporadic attendance in rehabilitation and feels certain that eventually he will achieve a complete and spontaneous physical return of functioning in all areas.

Patient 2. E. R., a 58-year-old quadriplegic female, is described by the staff as "passive," "dependent," "wishing to die." She appears irregularly for treatment; she seems unwilling to do anything for herself; and she evidently feels extremely guilty about her present condition. She is aware of the nature and extent of her disability but has gained almost nothing from months of stay in the hospital setting.

Patient 3. M.B. is a 32-year-old female with multiple sclerosis. She is pleasant,

Clinical Psychologist, Highland View Hospital.

talkative, and friendly, but completely denies her illness. She feels perfectly capable of getting along without any treatment and, although almost completely blind, plans a completely normal, active life for herself as soon as she leaves the hospital. She is cooperative in that she attends treatment with fair regularity, yet is entirely indifferent to her program and has gained virtually nothing from it.

Patient 4. P. C., a 50-year-old male quadriplegic, believes that, in spite of his spinal cord injury, he will achieve a complete return of function if only he works hard enough to overcome what he feels is his "muscular weakness." Energetic and cooperative, he always appears for therapy; he exercises constantly on the ward and is making good progress in rehabilitation.

Patient 5. W. B., a 66-year-old hemiplegic male, works every day in a sheltered shop on the hospital grounds for a token wage. A fairly dependable employee, his work is of good quality, although it is doubtful that he can work rapidly enough to compete with younger, more able-bodied individuals outside the institution. He has a history of alcoholism and tends to return to his old habits when threatened by discharge from the hospital. He recognizes this weakness and is satisfied with his current situation. Within the limits of his present dependent social situation, he is considered to be a successfully rehabilitated individual.

Patient 6. R. B., a 45-year-old paraplegic male, complains constantly of discomfort and pain, which is almost certainly of psychogenic origin. He has often been loud, hostile, and belligerent. Although considered to be a management problem, he shows steady progress, particularly in physical therapy, and responds reasonably well to treatment in spite of his complaints.

Patient 7. D. B., a 23-year-old quadriplegic female, has never been a hospital problem. Actively interested in every aspect of her program, she is bright, cooperative, and recognizes fully the extent and nature of her disability. She is probably as close as it is possible to being an "ideal patient."

Unitary Concept of Motivation

If one defines motivation as the factor which determines whether a given patient progresses satisfactorily in rehabilitation within the limits of his disability, it is evident that patients 1, 2, and 3 are to be labelled "poorly motivated." The rest of these patients must be considered to be more or less "well motivated;" in fact, general opinion at the institution from which these cases were drawn agrees substantially with this broad classification. Yet the psychological differences between these individuals, even within the same categories, are remarkable. Even upon detailed analysis it is virtually impossible to find any single psychological characteristic which would permit proper differentiation between one group and the other. The only apparent difference is in actual "progress;" and this is obviously an impractical criterion, since any patient's progress can be fairly judged only after rehabilitation has taken place. Thus, no prediction is either logically or practically possible within such a system. Nevertheless, certain regularities may become apparent if proper analytical procedures are applied.

Multiple Concept of Motivation

First, the unitary concept of motivation must be abandoned and replaced by other concepts which will not suffer from limitations such as those already discussed. Next, the whole notion of motivation must be viewed as subsuming a patterning of factors or dimensions which for convenience may be separately evaluated, but which actually operate in highly complex interrelationships. An absolute minimum of five concepts (or factors) must be considered for an adequate description of any individual patient's motivational state. Three of these factors are quantitative and lend themselves to relatively direct measurement with rating scales; the other two are more or less qualitative and do not yet lend themselves readily to numerical evaluation.

Reality-Orientation. The first quantitative factor is reality-orientation, which is defined as the extent to which the

patient recognizes the nature and extent of his physical disability.

Energy-Level. The second factor is energy-level, which may be defined as the degree to which the patient expresses himself in vigorous, spontaneous physical activity. Patients at one end of this dimension are described as "active;" patients at the other end are described as "passive."

Cooperativeness. The third factor is cooperativeness, the degree to which the patient accedes to the formal demands and requirements of the institution.

Application of Quantitative Factors. Each of the patients selected for illustration may be rated approximately on each of these three quantitative variables, with the results shown in the accompanying table. Notice patients 1 (D. G.), 3 (M. B.), and 4 (P. C.) have been rated as "unrealistic" with respect to their physical disabilities. Patients 1 (D. G.), 2 (E. R.), 3 (M. B.), and 5 (W. B.) are all considered to be basically "passive" individuals; and patients 1 (D. G.), 2 (E. R.), and 6 (R. B.) are rated as "uncooperative" in terms of their behavior with respect to the usual demands of their treatment program.

It will be observed that those individuals classified as "poorly motivated" show a predominance of minus signs in the summaries of their ratings, while those classified as "well-motivated" show a predominance of plus signs in their ratings. Patients who stand anywhere along any one of these dimensions may be either in the "well-" or the "poorly" motivated group; however, at least a gross distinction between groups is possible when all three factors are considered simultaneously.

It seems to follow from this analysis that certain values may be assigned to the extremes of each of these dimensions. All rehabilitation workers would probably agree that they prefer most to work with patients who are simultaneously "realistic," "active," and "cooperative;" it is doubtful if anyone would hold out a good prognosis for an individual described as "unrealistic," "passive," and "uncooperative" at the same

time. Among the patients discussed here, patient 7 (D. B.) would clearly represent the most ideal patient for treatment because she possesses all three of what might be termed the "desirable" psychological characteristics. Patient 1 (D. G.) would equally represent the most poorly motivated patient, because he alone possesses all three of the "undesirable" characteristics.

It would seem easy, then, to rank all the other patients between these two extremes by simply adding quantities together which represent a more precise estimate of each patient's position on each of the three variables, and by using these sums as indices of their motivational potentials. Unfortunately, motivation cannot accurately be made even as simple as this, for the two qualitative factors must also be included. These two factors are best termed "breadth of motivation" and "ultimate social requirements."

Breadth of Motivation. The "broadly motivated" patient is again exemplified by patient 7 (D. B.), who is realistic, active, and cooperative in every aspect of her rehabilitation program. The "narrowly motivated" patient is best exemplified by yet another case illustration: a 48-year-old paraplegic male who has developed a virtually compulsive concern for the care of his skin. This patient is extremely well motivated so long as he is permitted to expend vast amounts of energy on his own skin-care; yet he becomes actively uncooperative (though not necessarily unrealistic, according to his physician) if any effort is made to direct his behavior elsewhere for more than an hour or so at a time. A severely restricted patient such as this is very likely to appear extremely well motivated to some staff members (those who have responsibility for the care of his skin) and very poorly motivated to others (such as, for example, the psychiatrist). It is therefore essential that his psychological state be understood in terms of this factor which has been called "breadth" and which may be defined in terms of the specific type or types of rehabilitation activity one has in mind at any given time.

Ultimate Social Requirement. The final qualitative factor is designed to account for the requirements of the patient's eventual social placement; this factor will alter significantly the weights or "values" to be assigned to many of the others. Consider, for example, patient 5 (W. B.), whose institutional life requires a relatively passive, cooperative adjustment for subjective satisfaction; or patient 4 (P. C.), for whom it was possible for the psychologist to predict accurately a significant change for the worse in motivation when the time came that P. C.'s physician had to convince him he had received "maximum benefit" from the institution (although he still led only a wheelchair existence). Obviously, a "passive" person, such as patient 5 (W. B.), will be poorly motivated for a social situation requiring independence and competition, while even a thoroughly unrealistic patient, such as patient 4 (P. C.), may be well motivated if he is to return to a sufficiently protective, understanding environment. In the long run, motivation must be evaluated according to the patient's ultimate realistic goals; the degree to which specific social situations demand realistic, active, or cooperative behavior will determine the emphasis which should be placed upon these separate factors when evaluating a patient for rehabilitation.

Discussion

It is apparent, therefore, that all five factors mentioned work together, and

that from an explicit knowledge of each of these factors may appear not only a better understanding of the nature of motivation itself but also a better method for predicting success in rehabilitation. It is not argued that these five factors are *sufficient* to explain and describe all that is customarily included under the broad term "motivation." That they are *necessary*, however, appears at the moment to be beyond question. It is very possible that future experience will refine our understanding of some of the dimensions here proposed ("cooperativeness," for example, may not be an entirely unitary characteristic itself); but, as a first approximation, the variables listed include sufficient information to make the prediction of rehabilitation success far more feasible and accurate than it has been in the past.

By recognizing at once the composite nature of motivation and the multiplicity of factors which influence the physician's final judgment regarding whether a patient is well or poorly motivated, it will be possible to avoid the first pitfall which trapped the originators of intelligence testing; that is, the assumption that a psychological characteristic is global, general and unitary because common usage has assumed it to be so for many years and has attached to it a single label of tempting simplicity. Once proper factors have been isolated on the basis of clinical experience, and once these factors have been put to the test of actual use in the rehabilitation situation, new variables and specific technics

Summary of Motivation Ratings for the Seven Illustrative Cases

| | Dimension | | |
|---------------------------------------|-----------------------------------|----------------------------|---------------------------------------|
| | Realistic (+)— Unrealistic (—) | Active (+)— Passive (—) | Cooperative (+)— Uncooperative (—) |
| "Poorly Motivated" Patients | | | |
| 1. D. G. | — | — | — |
| 2. E. R. | + | — | — |
| 3. M. B. | — | — | + |
| "Well-Motivated" Patients | | | |
| 4. P. C. | — | + | + |
| 5. W. B. | + | — | + |
| 6. R. B. | + | + | — |
| 7. D. B. | + | + | + |

of measurement will present themselves. Theoretical refinement will increase and judgments which were once made purely on the basis of intuitive assumptions will be formulated systematically and evaluated objectively.

Conclusion

Motivation is not a single, unitary trait in any patient's behavior or personality. It is best described as a patterning of factors, five of which are presented as necessary, though possibly not sufficient, to account for a patient's motivational condition. Three of these factors are quantitative and have been termed the reality-orientation, the energy-level, and the cooperativeness factors. The other two factors are qualitative and are viewed as exerting modifying or weighting influences upon the first three.

These factors may be termed breadth of motivation and ultimate social requirements. When motivation is properly analyzed and defined, and when statements in each of the five areas suggested can be made with reasonable accuracy for any specific patient, the field of rehabilitation will find itself in a position to make significantly improved predictions of ultimate rehabilitation success. This improvement should show itself in greater accuracy of predictions and in allowing these predictions to be made earlier in the course of a patient's hospital stay.

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IMPORTANT ANNOUNCEMENT

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Contractures in Chronic Neurologic Disease

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The problem of contractures is encountered in almost every clinical syndrome dealt with in physical medicine and rehabilitation. Contractures are found in the following conditions:

1. Neurogenic:
 - a. Spasticity with muscle imbalance.
 - b. Paralysis or paresis with muscle imbalance.
 - c. Neuritis with pain and increased muscle tone.
2. Musculoskeletal:
 - a. Arthritis.
 - b. Muscle disease.
 - c. Dupuytren's contracture
 - d. Volkmann's Ischemic contracture.

Contractures associated with neurologic disease represent an important category with distinctive characteristics. This paper will be restricted to the neurogenic type of contracture, but many of the principles may be applied to contracture seen in other clinical conditions.

Historical Background

By 1881 clinical contracture was defined and described by Richet.¹ In 1884 Gowers² detailed the principles of prevention still applicable today. In 1917 a good review of the subject was made by Cooper³ in which he found that "contractures are seen in muscles that have been subjected to an excessive and prolonged degree of stimulation. The resistance to normal elongation is unaffected by deep chloroform anesthesia." In his discussion of treatment he placed stress on prevention.

In the 75 years since the first report, our understanding of this phenomenon has not increased significantly. A likely reason for this situation may be the attitude which until recently has prevailed concerning chronic disease. For too long in medical practice the complication of contracture has been accepted

as inevitable, to be accepted stoically by both patient and physician without hope for prevention or relief. A more positive approach to chronic disease developed since World War II has led to a renewed interest in the subject. It is hoped that this article will contribute to a reevaluation of neurogenic contracture and highlight areas that require further clarification.

Definition

The term "contracture" has been loosely applied to many clinical conditions in which there is limitation of passive range of motion. Many of these so-called contractures respond readily to conservative measures. On the other hand, a true contracture, as suggested by Cooper,³ is unaffected by deep chloroform anesthesia. In more recent times the tendency has been to favor the definition that includes limitation of range of motion which remains fixed even after denervation of the muscle. The maintained shortening of the muscle in contracture is considered to be independent of its innervation or blood supply.

Ranson⁴ has suggested that the term "myostatic contracture" be applied to that type of contracture which is dependent on the nervous system for its development but which is maintained independently of the nervous system once contracture is established. The term appears to be adequately descriptive and simple. If adopted for clinical usage, it would help reduce the confusion associated with the term "contracture." In this light, myostatic contracture is induced by nervous impulses resulting

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in unequal pulls upon the musculature of a joint. Thus the contracture seen in hemiplegia (upper motor neuron) or poliomyelitis (lower motor neuron) or paraplegia (upper motor neuron) all represent similar phenomena. Limitations of motion which do not persist after interruption of the efferent innervation could be called functional contracture. As the following case description will illustrate, a true myostatic contracture cannot be diagnosed until the nerve supply to the muscle has been interrupted.

A 62-year-old woman with a two-year history of degenerative spinal cord disease with marked spasticity was observed to have complete flexion of both knees so that the heels touched the thighs. This condition has been present for one and a half years. Treatment, consisting of stretching including traction, was completely ineffectual. Orthopedic surgery was recommended. With the patient under deep general anesthesia, the surgeon was able to readily reduce the "contracture." Full extension has been maintained with braces. This condition, then, was reversible and therefore cannot be designated as a true myostatic contracture, although prior to anesthesia it had appeared to be so.

Etiology

It is generally accepted that fixation of a joint with consequent immobilization of the related muscles is the basis for the development of all contractures. However, there is no agreement as to the extent or duration of fixation which will lead to a myostatic contracture. Riemke⁵ described contractures as of two types—functional and organic. The former he detected after 30 minutes of immobilization, and these were easily corrected by motor nerve section or under anesthesia. The latter developed in 2 or 3 days of immobilization and are true myostatic contractures. However, clinical observation indicates that many patients with chronic neurologic disorders such as Parkinsonism or hemiplegia do not develop myostatic contracture even after years of fixation. The case cited previously is one such example. Thus, it is

apparent that, though fixation is the most important causal factor in the development of contractures, other factors must also play a role.

The relation of pain to the development of myostatic contracture is undoubtedly an ancient clinical observation. Pain undoubtedly contributes to the in-processes which result in transformation of a functional contracture into a myostatic contracture. Very few of the references reviewed make more than a cursory observation of this relationship.^{6,7} Pain undoubtedly contributes to the increased tonus present in upper motor neuron disease. Pain acts as a stimulus to increase spasticity, a phenomenon frequently observed in paraplegia in which there is incomplete interruption of the spinal cord. In lower motor neuron disease it tends to promote further immobilization in a paretic extremity, which will favor the development of permanent fixation. The exact role of pain in the causation of contracture remains to be elucidated and offers a fertile area for study.

Pathology

There is no definitive description of the pathological changes found in muscle, capsule, ligaments or tendon in relation to myostatic contracture in man. The pathology of experimental contracture associated with tenotomy and tetanus has been detailed by Davenport and Fisher.^{8,9} The tetanus contracture was induced by the local injection into the muscle of a dose of tetanus which did not produce systemic reactions. The toxin travels along the motor nerve to the motor centers of the spinal cord. The reflex excitability of the corresponding segments of the spinal cord is increased with resulting increase in muscle tone. The histological findings in these laboratory types of contracture are: (1) muscle atrophy is found only in tenotomy; (2) destruction of part of the fiber content unevenly distributed throughout the muscle is seen in both types; (3) longitudinal striations are more pronounced in tenotomy and cross striations are blurred in both cases; (4) individual fibers are reduced to 50 per cent of their normal

length and their cross-sectional diameter is increased by 27 per cent; and (5) there is no increase in fibrous tissue. According to Ranson, "The blurring results from part of the fiber being thrown into a wavy contour."¹⁰ All these changes are reversible if the tendon reattaches or when the tetanus reaction subsides. None of the authors was able to relate pathological changes observed to an understanding of the cause of contracture.

Pathogenesis

An understanding of the pathogenesis of myostatic contractures would open the way to a better therapeutic approach. One of the earliest beliefs still evident is that the contracture is a result of an increase or change in fibrous tissue of the muscle tendon or joint. The observations just mentioned do not support this position. A number of authors favor the view that myostatic contracture is dependent on the contractile mechanism for its development.

The major evidence for implicating the contractile mechanism is:

1. In local tetanus, myostatic contracture persists for several days after section of the nerve and then disappears gradually as muscle atrophy begins.⁴ Such a reversal of contracture would not be expected if the connective tissue rather than the contractile mechanism were responsible for the contracture.

2. The myostatic contracture following tetanus and tenotomy is reversible if the primary condition is resolved. This again would not be expected if the contracture resulted from changes in the connective tissue.

3. Joint capsule and ligaments play a secondary role in uncomplicated myostatic contracture only in the later stages. After many months of immobilization, connective tissue will contribute to the limitation of motion because of shrinkage. This is in contrast to the major role these structures play in the contracture seen in rheumatoid arthritis. In the early stages of myostatic contracture, section of the muscle always will restore motion, thus demonstrating that the limitation of motion is a result of changes within the muscle rather than in the joint structure.

4. The prevailing view is that contractures do not develop in denervated muscles even when these muscles are held passively in the shortened position. The lack of activity in the contractile mechanism probably accounts for the absence of contractures. Occasionally a type of contracture that develops only after prolonged periods (months) is observed in denervated muscle. This phenomenon is probably related to the adaptive shortening of the connective tissue rather than to changes in contractile mechanism as seen in myostatic contracture.

Apparently it is within the contractile mechanism that we must look for the changes that result in contracture. In 1911, Oppenheim¹¹ declared that the shortened state in the contracted (*sic*) muscle is a result of some change in the chemical equilibrium of the contractile mechanism rather than a structural change (increased fibrous tissue) in the muscle. Though this opinion appears to be generally held today, there is little information existing which clarifies the nature of the changes in the contractile mechanism. Certain aspects of the contractile mechanism are worth reviewing.

Characteristics: Physiological contractures, which may be initiated by maximal electrical stimulation, have been described by Gasser¹² as having the following characteristics:

1. The normal contractile mechanism is involved.
2. The muscle remains in contraction after the stimulus has ceased.
3. The changes are completely reversible.

Myostatic contracture may then represent an extension of the physiological contracture to the point where the changes within the contractile mechanism are no longer reversible. This hypothesis deserves further consideration.

Delta State: Ramsey¹³ observed that if single muscle fibers were permitted to shorten in response to electrical stimulation below 65 per cent of the resting length, they would not return to resting length when the stimulus was removed and resisted stretching loads far in excess of the normal fiber. The muscle in the

delta state may be only 30 per cent shorter than normal. This discrepancy between the degree of shortening of the fiber (35 per cent) and the muscle (30 per cent) is accounted for by the obliquity of the muscle fibers within the muscles studied. The delta state may well be an extension of processes that produce physiological contracture but at an irreversible stage. In the presence of spasticity with or without pain, muscle fibers may shorten to 65 per cent of their resting length. The resistance to elongation of the muscle then encountered would first be a manifestation of increased tone and gradually a mixture of increased tone combined with resistance to elongation of these fibers in the delta state. When myostatic contracture has developed, the major part of the resistance would be from fibers in the delta state.

Physical Changes: Ranson¹⁰ found the physical changes of myostatic contracture to be very similar to those seen in rigor mortis. There is a decrease in elasticity and an increase in permanent deformation (lack of return to resting length when stretched).

Treatment

The basic principles applied today in the treatment of myostatic contracture were detailed and reviewed by Cooper (1917) and more recently by Rienke (1932). The use of muscle relaxants and the development of surgical technics for reducing spasticity (rhizotomy) can be considered more modern contributions to the management of this problem.

The first goal of therapy in myostatic contracture is prevention. Patients with neurologic disorders should be observed carefully for limitation of range of motion, which should be detected early. If limitation of motion of joints is present, vigorous measures should be taken to maintain normal range of motion. These measures should include the following:

1. *Passive and Active (where possible) Movement Through Full Range of Motion Several Times Daily:* Excessive force in stretching should be avoided since pain will augment the muscle tone and thus increase the danger of contracture. Note

should be taken that peripheral nerve palsies have been reported after excessive stretching.¹⁴ Stretching may be applied by means of skin¹⁵ or skeletal¹⁶ traction.

2. *Control or Elimination of Factors, such as Pain and Inflammation:* These must be controlled so that range of motion as described previously can be effectively carried out. Local heat with or without massage and combined with muscle relaxants may suffice in milder cases. Neurological procedures, such as anterior rhizotomy or peripheral neurectomy, may be indicated when increased tone cannot be controlled by conservative means.

The value of steroids in suppressing inflammatory reactions warrants a trial of these agents in prevention of contractures. Positive results are to be expected when there is gross evidence of joint inflammation accompanied by pain. Also, when functional contracture is present, microscopic inflammatory changes in the muscle and supporting structure may play a role in reducing mobility. Short-term steroid therapy may warrant a trial in permitting greater ease in maintaining range of motion.

3. *Maintenance of Corrected Position:* Inadequate maintenance of corrected position accounts for many failures in prevention of contracture. If the position cannot be maintained actively by the patient, suitable splints or braces must be used.

With the proper application of these three principles, contractures in chronic neurologic disease can be generally considered preventable.

If contracture is already present, the measures as described under prevention should still be applied. Lack of response to therapy is presumptive evidence that the contracture is myostatic rather than functional. The diagnosis should be confirmed by temporary interruption of the nerve supply to the involved muscles, either by spinal anesthesia or peripheral nerve block. Prompt surgical intervention is indicated for the myostatic contracture. The various surgical measures applicable to the treatment of myostatic contracture are beyond the scope of this presentation. The procedures used are relatively nontraumatic even in the aged,

and prolonged delay is not warranted. Postoperative care must include measures for maintaining the corrected position. A brace should be worn until clinical observation indicates that the condition will not recur.

A special therapeutic situation exists with peripheral nerve lesions. The problem is loss of tone. Sherman⁶ has evaluated the role of massage, passive range of motion, and electrical stimulation after experimental peripheral nerve lesions. He noted that the treatment had no influence on the onset of contractures in the completely denervated muscle. In animals in which the nerve was sectioned and immediately sutured, massage and passive range of motion had a positive influence in reducing the number and severity of contractures. Electrical stimulation also had a positive effect in this group, but only during the denervated state. When electrical stimulation was continued beyond the onset of reinnervation, a deleterious effect was noted. The more intensive the stimulation during reinnervation, the more closely the frequency and severity of contracture approximated the untreated animals. In conclusion Sherman states, "treated muscles were more pliable even when showing contracture. With moderate or mild force they could be stretched so as to produce the full range of motion with production of relatively little pain." Whether these results for the experimental animal can be transferred to the management of the same problem in man is another unresolved problem which awaits further study.

Discussion

Advances in rehabilitation medicine during and since World War II have brought special emphasis to the care of the patient with chronic disease. Patients with the more common neurologic disorders, such as hemiplegia, cerebral palsy, paraplegia, poliomyelitis, and multiple sclerosis, are now being restored to maximum function consistent with residual physical capacity. Contractures, functional or myostatic, not infrequently delay or even prevent rehabilitation in these cases. The magnitude of the problem is bound to increase as medical

advances further extend the life span without resolving or controlling the causes of chronic disease.

This presentation has highlighted aspects of contracture associated with chronic neurologic disease which suggest working hypotheses of etiology and pathogenesis. The elucidation of pathogenesis will probably be arrived at through greater understanding of the physiology of muscle contraction and its relation to such phenomena as physiological contracture and the delta state.

Of more immediate importance to the management of this problem is the role of several factors in the development of contracture. A clearer understanding of the importance of immobilization and pain in the development of myostatic contractures would manifest itself by a more rational approach to prophylaxis and treatment. In addition, the role of personality remains to be evaluated. Several articles in the literature^{6, 7} comment on the personality factor in patients with contractures without actually exploring the problem. One, for example, describes five cases of flexion contracture of the knee in hemiplegia, in which three of these patients were described as having personality disorders. It is also common knowledge that hysterical patients not infrequently develop limitation of joint motion in the "paralyzed" extremity.¹⁷

Our clinical observation also has given us the impression that patients with contracture often appear to have personality disturbances not seen in patients having similar disabilities without contracture.

In an attempt to clarify this impression, we gave complete personality tests to a group of hemiplegic patients with and without contractures of the knee. The preliminary results indicate that the contracture group exhibits evidence of more severe brain damage. They also showed emotional traits of the hysteric and a tendency to deny the disability. The group tested has given some support to this clinical impression, but it is not large enough to justify establishing the above facts as an observation.

If future results confirm this preliminary impression, such testing may prove to be a feasible means of determining which patients are more likely to develop

contracture. Preventive measures could then be directed toward this type of patient rather than being provided uniformly for all patients under treatment.

At present the best defense against these deformities is early detection. We feel that the teaching of the simple principle of early detection combined with vigorous measures to maintain range of motion should be part of the curriculum of the undergraduate and graduate medical student. With the proper application of the technics outlined under Treatment, see page 643, these deformities should be considered preventable.

Finally, some agreement should be reached as to nomenclature. Today, the term "contracture" is very loosely applied to many clinical conditions. We have supported the use of the term "myostatic contracture" as recommended by Ranson for fixed limitation of motion, and the term "functional contracture" where the limitation of motion is correctible by conservative means.

Although many questions introduced throughout this paper remain questions at the end, it is hoped that through this presentation a more vigorous clinical approach will be made to the prevention and management of this disabling complication of chronic neurologic disease.

Summary

Contractures accompanying various neurological diseases play a significant role in their rehabilitation management. Immobilization and the undetermined contribution of factors such as pain and personality are the underlying causes for the development of contracture. The exact pathogenesis and even pathology is yet to be determined. Further understanding as to pathogenesis is to be expected through studies of the physiology of muscle contraction and such phenomena as physiological contracture and the delta state. Of more immediate importance is the fact that sufficient clinical knowledge exists to prevent this distressing disability. If all those responsible for the care of patients with acute and marked neurological disease could become acquainted with the simple technics for the prevention of contractures, this complication could be virtually eliminated.

It is recommended that the term "myostatic contracture" be applied to those contractures that are dependent on the nervous system for their onset, but are maintained independent of nerve innervation once fully developed.

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Rapid Measurement of the Tension of Carbon Dioxide in Blood

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When normal respiratory physiology is impaired, the management of this state can be more intelligently pursued if the partial pressure of carbon dioxide ($p\text{CO}_2$) is known. At present, the procedures involved in coming by this knowledge are so unwieldy that usually respiratory problems are dealt with on the basis of information having a less direct bearing on the situation. Improvements in the *in vitro* methods for measuring the $p\text{CO}_2$ of blood will not get around the obstacle of acquiring a sample of blood. However, anyone who has faced the problem of measuring blood $p\text{CO}_2$ for either clinical or research purposes will appreciate that the methods now available leave something to be desired.

In this paper, work is reported on a physical method for measuring the $p\text{CO}_2$ of blood.¹ In order to remove some of the ambiguity regarding gas tensions, a review of the basic physical concepts pertaining to the $p\text{CO}_2$ of gas in a fluid and the significance of the $p\text{CO}_2$ of blood in respiratory physiology will be given.

Some Basic Concepts

There are two quantities of importance in describing the state of a gas dissolved in a liquid — the concentration and the partial pressure. The concentration is the amount of gas per volume of fluid. The partial pressure of the gas is the pressure at which the gas above the liquid must be applied to the liquid surface to prevent any net transfer of gas to or from the liquid phase. In another way of expressing it, the partial pressure of a gas in a liquid is a measure of the number of molecules of gas striking a unit area of the liquid surface

per unit time. From this point of view it may be seen that the partial pressure of a gas in a liquid is an index of the activity of the gas while the concentration expresses the load of gas which the liquid carries. Physiologically, both the partial pressure and concentration of gases in the blood play a significant role. In the normal control of respiratory effort, the $p\text{CO}_2$ in the tissue of the respiratory center is the prime mover. Thus, in studying either normal or pathological respiration it would be ideal to follow the $p\text{CO}_2$ in this tissue or its near equivalent, the $p\text{CO}_2$ in blood from the internal jugular vein. In clinical application, though sampling from this site is not usually practical, it is feasible to sample from the systemic arterial system, thus obtaining a sample in which the $p\text{CO}_2$ has a direct bearing on the environment of the respiratory center. Therefore, we usually deal with the estimation of the $p\text{CO}_2$ of systemic arterial blood, a quantity normally in the vicinity of 40 mm. Hg.

Methods for Measuring $p\text{CO}_2$

Turning to a consideration of the methods currently available for this measurement, there are two which are common to the laboratory. One of these, the Henderson-Hasselbalch² or indirect method, makes use of the known

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and well-established relationship between the pH, the CO₂ content, the oxygen saturation, and the pCO₂ of blood. After separate determination of the first three of these quantities, the pCO₂ may be calculated. Although in the hands of an experienced analyst this method is capable of considerable precision, it is laborious and time consuming.

The other method, the Riley³ or so-called direct method, consists of equilibrating a blood sample with a bubble of gas followed by chemical analysis of the gas for its CO₂ content. Again, though in comparable situations this method is faster, it still requires approximately half an hour to accomplish a single measurement.

The clinical situations in which it is important to know the pCO₂ of blood are, for example, in adjusting the level of a respirator in assistive respiration or in ascertaining the respiratory status during surgery where normal respiration has been altered. In such cases it is frequently of vital importance to have quantitative information with a minimum delay.

In searching for possible improvement, our attention was drawn to physical methods. Analytical procedures based on physical principles are usually simpler than their chemical counterparts. In many instances they are also speedier. Speed and simplicity are frequent and understandable goals in routine laboratory analyses. Contemplating the employment of a physical method for measuring the pCO₂ of blood, it would appear essential to effect some preliminary simplification in the physicochemical system on which the measurement is to be made. Nearly any one of the physical characteristics of blood, such as the total gas pressure, the electrical resistance, the pH, specific gravity, or the optical density, is a quantity affected by many of the constituents of blood. Hence a direct measurement of any one of these quantities would not specifically detect the carbon dioxide by itself. Of the possible means by which a simplification could be obtained, few are more inviting theoretically than a semipermeable membrane, permeable only to carbon dioxide.

If such a membrane were available, any of a variety of measurements would suffice to detect and quantitate the CO₂ in a sample of blood. Real membranes, of course, are never so obligingly ideal. However, many substances are highly selective in their permeability. Of the materials which are familiar, rubber is well known among respiratory physiologists for its inability to hold back CO₂. On the other hand it is commonly regarded as being impervious to water.

The pCO₂ Cell

Since blood is an aqueous system, we started with the assumption that a rubber membrane would be permeable to CO₂ and sufficiently impermeable to interfering constituents to allow a measurement influenced by CO₂ alone to be made on one side of a membrane in contact with the blood of undetermined pCO₂. Rubber is permeable to all of the gases dissolved in blood; consequently, a direct pressure measurement would not detect the CO₂ alone. The well-known influence of dissolved CO₂ on the hydrogen ion concentration of an aqueous solution was chosen as the means of quantitatively detecting the carbon dioxide. The essential idea is to separate blood from a film of water with a rubber membrane; to allow the CO₂ from the blood to pass by diffusion through the membrane; and, at equilibrium, to infer the pCO₂ of the blood from the pH of the water film. It should be emphasized that the pH of the blood is not measured, but rather the pH of the film of water equilibrated with the blood insofar as the CO₂ is concerned.

Because the diffusion of gases through liquids is a slow process, it is important in the practical implementation of the principle of the method to employ pH electrodes different than those commonly used. Figure 1 illustrates the arrangement that we have found satisfactory. Two separate electrodes, a glass electrode and a reference electrode, are necessary. The reference electrode, a silver-silver chloride electrode, is prepared on the outer wall of a standard Beckman general purpose glass electrode.

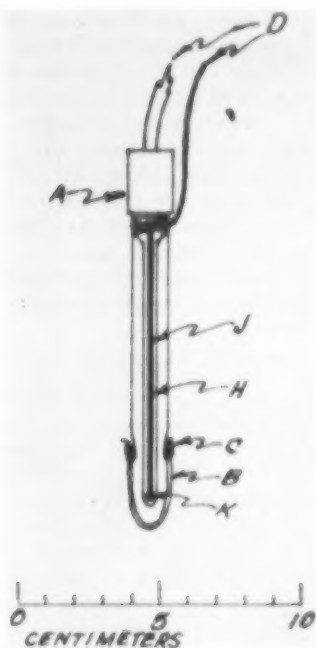


Fig. 1—The $p\text{CO}_2$ cell. A, Beckman general purpose glass electrode; B, rubber membrane—finger cot pulled tightly over sensitive end of glass electrode and silver-silver chloride electrode; C, rubber band securing finger cot; D, electrode leads; H, strip of Tygon enamel on outer surface of glass electrode; J, strip of "silver print" painted on Tygon (strip of Tygon covering silver except at lower tip not shown); K, exposed tip of silver upon which silver chloride is deposited electrolytically.

Thus the pH cell is established in the form of a single probe over which a rubber membrane can be stretched, trapping a very thin film of water between the rubber and the glass.*

* Since this paper was presented, we have obtained a newly developed electrode from Beckman Instruments, Inc., Fullerton, Calif., Electrode No. X-800-64. This electrode performs the same function as the electrode of our fabrication. Preliminary tests indicate that this electrode is convenient and satisfactory in the present application.

Mention should be made of a significant alteration in the EMF of the $p\text{CO}_2$ cell following construction. As has been described previously, the reference electrode is a silver-silver chloride electrode. In use, once the rubber-covered cell is mounted in the cell chamber, the film of silver chloride deposited on the exposed silver tip is continuously in contact with rubber. We have used ordinary finger cots stretched tightly for this membrane.

Within a few days after construction, the over-all EMF of the cell changes to a value exceeding that which can be measured with an ordinary pH meter. By comparing the over-all EMF of the cell before and after this deterioration, we suspect that this change is due to an alteration in the chemistry of the reference electrode from silver-silver chloride to silver-silver sulfide. Even though this change occurs, we have found that the cell with this increased EMF may be used by applying a bucking voltage in series with the lead from the reference electrode. The bucking voltage is inserted with the positive side toward the reference cell and the negative side toward the pH meter. In order to bring the pH meter reading to approximately the same point on the scale as is obtained with a fresh silver-silver chloride electrode, a bucking voltage of about 0.9 volts is needed.

Calibration Procedure

In order to explain the procedure for calibration it is necessary to recall a few facts regarding the electrical measurement of pH. The electromotive force of the pH cell is directly proportional to the pH of the solution of known pH, a standard buffer. In the present instance, the cell cannot be conveniently exposed to a standard buffer since it is covered by the rubber membrane. To standardize the readings obtained, the membrane-covered unit is exposed to a solution of known $p\text{CO}_2$. This is an ordinary saline solution which is equilibrated to a known $p\text{CO}_2$ by bubbling a gas mixture of known CO_2 concentration through it. In practice, several solutions of different $p\text{CO}_2$ values are used to establish a calibration curve and an unknown sample is analyzed by reference to the calibration curve. The expected relation between cell EMF and $p\text{CO}_2$ is given by the following equation: $\Delta \text{EMF} = -30.3 \Delta \log p\text{CO}_2$ millivolts.

It may be seen that the EMF is linearly related to the log of the $p\text{CO}_2$. For this reason the EMF is plotted versus the log $p\text{CO}_2$ in order to obtain a straight line. One of the encouraging results has been the reproducibility and

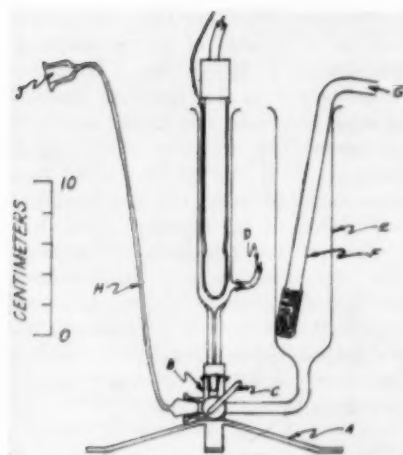


Fig. 2—Assembly for electrical measurement of $p\text{CO}_2$; A, support; B, three-way hypodermic stopcock; C, stopcock handle (arrangement for rotating stopcock from above the water level not shown); D, outflow from $p\text{CO}_2$ cell chamber; E, tube for holding calibrating solution; F, fritted glass gas dispersion tube; G, inflow for standard gas mixture; H, hypodermic tubing for conveying blood to cell chamber; J, needle fitting for syringe containing blood sample.

constancy of the slope of the calibration curve. Because of this fact, once a cell has been calibrated, it is necessary to check only one point of known $p\text{CO}_2$ when a series of analyses is being performed. This simplification aids in reducing the time required to perform a measurement.

Technic

All solutions, either calibrating solutions or unknown samples which are subjected to measurement must, of course, be handled anaerobically because of the labile nature of the dissolved CO_2 . For this reason the cell is mounted in a glass chamber enclosing a space of minimal volume, approximately 0.5 cc. Test solutions are forced through this chamber.

Since the solubility of CO_2 in either blood or water is highly dependent on temperature (the temperature coefficient of solubility is about 5 per cent per degree near body temperature),⁴ it is necessary to thermostat the cell and also the tubes in which the calibrating solutions are equilibrated. Figure 2 shows the entire assembly for handling both

blood and calibrating solution. This assembly is immersed in a water bath held at $38^\circ\text{C} \pm 0.05^\circ\text{C}$. By means of the stopcock, either calibration fluid or blood can be admitted to the cell chamber. The outflow from the cell chamber is shown at D.

Three to five minutes are required to obtain a stable reading when a calibrating solution is exposed to the $p\text{CO}_2$ cell. Because of the higher solubility for CO_2 , blood exhibits a more rapid equilibration than the calibrating solutions. In analyzing a blood sample, a check reading is first taken with a calibrating solution followed by a reading on the blood sample. Thus, approximately ten minutes are required to obtain an analysis on a single sample.

The sensitivity of the method depends on the change in EMF accompanying a change in the $p\text{CO}_2$. For tensions in the neighborhood of 40 mm. Hg, the change is approximately 0.56 mV/mm. $p\text{CO}_2$. For the pH meter we use, one of the most sensitive instruments commercially available, the reading sensitivity is about 0.1 mV. Thus the limiting precision is roughly 1/5 of a mm. Hg. Practically, we have found that the over-all precision and reproducibility is approximately 1/2 mm. Hg.

In order to study the accuracy and reproducibility of this method for estimating the $p\text{CO}_2$ of blood, we have carried out a procedure in which blood was equilibrated to a known $p\text{CO}_2$ and then analyzed by the method just described. Table 1 presents the data

Table 1: Summary of the Results on Electrical Measurement of $p\text{CO}_2$ on Blood Equilibrated with a Known Gas Mixture

| | | |
|----------------------------|-------------|-------------|
| Known $p\text{CO}_2$ | 8.44% | 5.77% |
| Observed values | 8.34 | 5.66 |
| | 8.38 | 5.66 |
| | 8.38 | 5.74 |
| | 8.41 | 5.76 |
| | 8.42 | 5.81 |
| | 8.42 | |
| | 8.46 | |
| | 8.48 | |
| Mean | 8.41 | 5.73 |
| Standard deviation | ± 0.045 | ± 0.065 |
| Systematic error | -0.03 | -0.04 |

summary for this study. Two reference gas mixtures were used as standard values; 8.44 per cent and 5.77 per cent. The standard deviations are 0.045 per cent and 0.065 per cent respectively. It may be observed that the standard deviations are in the vicinity of 1 per cent of the values obtained. There was no statistically significant systematic error. This gives an indication of the magnitude of the over-all errors involved. An additional check on this method was obtained by comparing the results of blood analysis by the Riley method with those obtained by this method on the same sample of blood. In this series the agreement was consistently within the estimated error of the Riley method (± 3 mm. pCO₂) as used by the collaborating technician. Thus the reliability of this method has been established and it has been shown that the technic is capable of considerable accuracy.

Discussion

In discussing this method in its relation to those commonly employed we find that as compared with an analysis

time of one half to one hour, the present method is capable of giving results in ten minutes. Though this is a modest improvement in the speed of analysis, in some situations this saving would be of value. The accuracy of the results obtained with the pCO₂ meter rival those obtained under the best conditions with either of the chemical methods.

Two of the drawbacks in applying this method which are to be considered are that the method requires specialized equipment not now in general use, and the technic is not familiar to medical laboratory personnel and would require new training and practice.

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SUCCESS IS THE KEYNOTE

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Child Care Testing in Functional Training

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George R. Stephenson, Ph.D.
and
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There is general agreement on the desirability and need for child care instruction for the disabled mother. The disabled mother, after discharge from hospital or rehabilitation center, is faced with many anxieties about caring for a child. Will she be able to dress, feed, and bathe the child? She knows that she must work out methods for child care and, for the welfare and happiness of her child, she must allot a certain amount of the responsibility for child care to other members of the household.

In short, the disabled mother has a special need for functional training. She is faced with many frustrating problems which should be a direct concern of personnel concerned with her rehabilitation. She requires more than reassurance; she needs special work technics and equipment to enable her to return home confident that she will be able to care for a child.

The immediate problem is one of method and content—the "how and what" rather than "why." Some questions now being considered by physicians and therapists who teach functional training are: What kind of measurement will give the best summary of the disabled mother's ability to carry on successfully in caring for a child? What activities should be included in the course of training? In what order should they come and who should do the teaching? Will modification of the nursery to the needs of the patient facilitate child care? What adaptive child care equipment will help the disabled mother in the nursery? What basic methods for child care, including dressing, feeding, and bathing, can be devised?

At the New York State Rehabilitation Hospital, the basic training unit (fig. 1) is a nursery which has been functionally arranged for use by wheelchair patients and individuals with prosthesis or braces

and crutches. The scope of the program includes child care evaluation, development of adaptive child care equipment, nursery planning, and teaching of compensatory child care activities. However, it should be emphasized that functional training in child care does not emphasize child care *per se*, that is, modern ways of preparing a baby's formula, feeding hints, when to begin toilet training, or how to cope with the problem of thumb-sucking. Such child care training is the concern of the nurse or other qualified person. Functional training in child care emphasizes, for the most part, methods of performing the physical skills inherent in child care either with normal patterns of movement or through substitution-compensatory movement patterns when power or control essential for normal movement is affected. To insure proper teaching of child care training the program is conducted jointly by a nurse and therapist who, together, work out tricks and tips for the disabled mother. Since it would be impossible to discuss all the procedures required to provide the disabled mother with a complete and integrated program of child care, this paper will be concerned with only child care testing.

The following test is the one developed in 1953 at the New York State Rehabilitation Hospital. The test is used primarily as an instructional method which indicates to both patient and therapist the level of accomplishment and gives direction to the skills considered important in the learning situation. The form is used for disabled mothers with disabilities of upper as well as lower extremities.

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Senior Clinical Psychologist, New York State Rehabilitation Hospital.

Principal Physician, Physical Medicine, New York State Rehabilitation Hospital.

Individual items of the Child Care Activity Test are reproduced in figures 2 and 3. The form reproduced in figure 2A provides for a summary of the patient's score. Procedures for grading and scoring the test are outlined in the following steps:

Procedure for Grading

- Step 1. Have patient attempt each test item appropriate for her classification as WC, AMB WA, or AMB WOA.
- Step 2. Enter the time required to perform the item in the box under the heading PT.



Fig. 1—A, B; ways in which a play pen can be adapted for the wheelchair patient to facilitate lifting child in and out.

- Step 3. The degree of success is indicated by entering the appropriate symbols in each of the three boxes in accordance with the scheme noted under "Key to Grading."

Procedure for Scoring

- Step 1. Transfer PIT totals from test sheets.
- Step 2. Add PIT totals horizontally and enter sum in boxes provided under total performance.
- Step 3. Add each PIT column vertically and enter sum in boxes provided under "Total-Part I" and "Total-Part II."
- Step 4. Add totals of Part I and Part II and enter sum in box provided under "Final Score I plus II."
- Step 5. Divide this total by maximum figure for WC or AMB level whichever applies.
- Step 6. Enter quotient in box provided in "Percent of WC Maximum" or "Percent of AMB Maximum" whichever applies.

Since child care involves the management of appropriate equipment and the safe handling of the child as well as direct child care procedures, the test provides for separate measure of these abilities. While the mother may initially be concerned only with the immediate and personal nursing care of the child, there are a number of essential peripheral activities she must perform. For example, the mother must not only be able to feed the child but must also be able to prepare the infant's formula, sterilize equipment, and clean up after the actual feeding. Moreover, she must be able to manage the child's weight safely until he is old enough to walk or sit unaided. Thus the summary sheet (figure 2A) yields separate total scores for use of equipment, for direct child care procedures and for safe management of the child's body weight in both of these areas. Based on the combination of totals in each of these areas the extent to which the patient can assume full responsibility for the child's care and specific areas in which she will require assistance should be apparent to the mother and therapist. Without this information, em-

phasis on accomplishment of crucial skills or planning for necessary delegation of responsibility cannot be made.

The procedure for administering and grading performance in each activity has been discussed in the preceding paragraph under Procedure for Grading and Procedure for Scoring. The scoring system corresponds to that developed in a previous article.¹

The test is composed of 77 activities. Many activities are broken down further into elements that are identified with lower case letters. To the left of the

description of the activity is the time limit allowed for performing the task (ST = standard time). The times listed represent a crude average of the time required by patients who had achieved a maximum degree of rehabilitation to accomplish the activity under local conditions.

The right half of each test page consists of four columns labeled to indicate their use for patients described as "(WC) wheelchair," "(Amb. WA) ambulant with apparatus," and "(Amb. WOA) ambulant without apparatus." Within

A NEW YORK STATE REHABILITATION HOSPITAL, WEST HAVEN, CONN. DEPARTMENT OF PHYSICAL MEDICINE - PHYSIOLOGICAL REHABILITATION SECTION

CHILD CARE ACTIVITY TEST

| Activity | ST | WC | WA | WOA | Therapist |
|------------------|-------|----|----|-----|-----------|
| 1. Dressing | 10:00 | | | | |
| 2. Undressing | 10:00 | | | | |
| 3. Bathing | 10:00 | | | | |
| 4. Grooming | 10:00 | | | | |
| 5. Feeding | 10:00 | | | | |
| 6. Drinking | 10:00 | | | | |
| 7. Eating | 10:00 | | | | |
| 8. Eliminating | 10:00 | | | | |
| 9. Sleeping | 10:00 | | | | |
| 10. Walking | 10:00 | | | | |
| 11. Running | 10:00 | | | | |
| 12. Climbing | 10:00 | | | | |
| 13. Jumping | 10:00 | | | | |
| 14. Crawling | 10:00 | | | | |
| 15. Reaching | 10:00 | | | | |
| 16. Grasping | 10:00 | | | | |
| 17. Holding | 10:00 | | | | |
| 18. Throwing | 10:00 | | | | |
| 19. Pushing | 10:00 | | | | |
| 20. Pulling | 10:00 | | | | |
| 21. Carrying | 10:00 | | | | |
| 22. Lifting | 10:00 | | | | |
| 23. Putting down | 10:00 | | | | |
| 24. Opening | 10:00 | | | | |
| 25. Closing | 10:00 | | | | |
| 26. Turning | 10:00 | | | | |
| 27. Twisting | 10:00 | | | | |
| 28. Bending | 10:00 | | | | |
| 29. Stretching | 10:00 | | | | |
| 30. Releasing | 10:00 | | | | |
| 31. Grasping | 10:00 | | | | |
| 32. Holding | 10:00 | | | | |
| 33. Throwing | 10:00 | | | | |
| 34. Pushing | 10:00 | | | | |
| 35. Pulling | 10:00 | | | | |
| 36. Carrying | 10:00 | | | | |
| 37. Lifting | 10:00 | | | | |
| 38. Putting down | 10:00 | | | | |
| 39. Opening | 10:00 | | | | |
| 40. Closing | 10:00 | | | | |
| 41. Turning | 10:00 | | | | |
| 42. Twisting | 10:00 | | | | |
| 43. Bending | 10:00 | | | | |
| 44. Stretching | 10:00 | | | | |
| 45. Releasing | 10:00 | | | | |
| 46. Grasping | 10:00 | | | | |
| 47. Holding | 10:00 | | | | |
| 48. Throwing | 10:00 | | | | |
| 49. Pushing | 10:00 | | | | |
| 50. Pulling | 10:00 | | | | |
| 51. Carrying | 10:00 | | | | |
| 52. Lifting | 10:00 | | | | |
| 53. Putting down | 10:00 | | | | |
| 54. Opening | 10:00 | | | | |
| 55. Closing | 10:00 | | | | |
| 56. Turning | 10:00 | | | | |
| 57. Twisting | 10:00 | | | | |
| 58. Bending | 10:00 | | | | |
| 59. Stretching | 10:00 | | | | |
| 60. Releasing | 10:00 | | | | |
| 61. Grasping | 10:00 | | | | |
| 62. Holding | 10:00 | | | | |
| 63. Throwing | 10:00 | | | | |
| 64. Pushing | 10:00 | | | | |
| 65. Pulling | 10:00 | | | | |
| 66. Carrying | 10:00 | | | | |
| 67. Lifting | 10:00 | | | | |
| 68. Putting down | 10:00 | | | | |
| 69. Opening | 10:00 | | | | |
| 70. Closing | 10:00 | | | | |
| 71. Turning | 10:00 | | | | |
| 72. Twisting | 10:00 | | | | |
| 73. Bending | 10:00 | | | | |
| 74. Stretching | 10:00 | | | | |
| 75. Releasing | 10:00 | | | | |
| 76. Grasping | 10:00 | | | | |
| 77. Holding | 10:00 | | | | |

B NEW YORK STATE REHABILITATION HOSPITAL, WEST HAVEN, CONN. DEPARTMENT OF PHYSICAL MEDICINE - PHYSIOLOGICAL REHABILITATION SECTION

CHILD CARE ACTIVITY TEST

C NEW YORK STATE REHABILITATION HOSPITAL, WEST HAVEN, CONN. DEPARTMENT OF PHYSICAL MEDICINE - PHYSIOLOGICAL REHABILITATION SECTION

CHILD CARE ACTIVITY TEST

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CHILD CARE ACTIVITY TEST

Fig. 2 — Child Care Activity Test.

child in conjunction with performance of the activity. These items involving management of the child are identified with an asterisk in the test. Wherever an asterisk appears, the earned score on that part of the item is doubled in computing the subtotals appearing in the body of the test. The weighting of the items was required in order that management of the child receive approximately equal weight in comparison with use of equipment and child care procedures in the final totals of the test.

The following illustrates the scoring procedure. For example on item number 1, the patient is found able to lower the sides of a crib satisfactorily but needs assistance in case it becomes jammed and requires more than twice the allotted time to perform the activity. This item would be marked "X" under performance, "I" under independence and "O" under time. Corresponding numerical scores would be 2, 1, and 0 for a total of 3. The elements of the activity, in this case "a. Manipulates release lever" and "b. Lowers side to desired height," do not enter into the scoring directly but serve to indicate areas in which further instruction or training are necessary. If the therapist wishes she may shade the area opposite the element in red as an aid in identifying elements which need further training as suggested in figure 2A under "Key to Grading." Items 2 through 6 are marked in the same way but in adding the total for all activities involving the crib, scores on items 5 and 6 would be doubled. Thus a maximum numerical score of 6 could be earned on items 1 through 4; a maximum score of 12 could be earned on item 5 and on item 6, yielding a maximum total score of 48 for crib activities as indicated in the summary sheet reproduced in figure 2A. Maximum scores are given in figure

2A for each group of activities as a basis of comparison. Where two numbers are given, for example, 18/6 for carriage activities, the first number refers to the maximum score which an ambulant patient can earn, the second number refers to the maximum for wheelchair patients. The total maximum score is used to convert patient's scores to a per cent which represents the proportion of activities the patient is able to perform (see Procedure for Scoring).

Summary

The responsibility of child care is a crucial problem for the disabled mother after discharge from hospital or rehabilitation center. A test has been described in this paper that offers a means of evaluating the patient's skill and physical ability to carry out this task. The test provides for evaluation in two areas, management of nursery equipment and personal care of the child. Performance can be tested with the patient in either the sitting or standing position in accordance with the patient's residual ability. A method of grading is explained which takes into account the patient's proficiency of performance, independence and safety, and time. The results of the test can be used as a basis for a teaching program in necessary child care skills based on individual needs.

Acknowledgment: The authors are grateful to Edward Schlesinger, M.D., Associate Director of Medical Services, New York State Department of Health, who graciously reviewed the original manuscript and offered suggestions of an editorial nature which did much to improve the clarity of the material.

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Clinical Note: Shoulder Support for the Hemiplegic Upper Extremity

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Following the acute episode of a cerebrovascular accident, the patient often manifests flaccidity in the hemiplegic extremity. This state of muscular quiescence may persist for three to four weeks or longer before some physiological tone returns. Despite this spontaneous return, it is generally found to be insufficient to compensate for gravity-produced strains upon structures of the upper limb during sitting and standing postures.

Since current practice of early rehabilitation of the hemiplegic incorporates sitting and frequently standing and ambulation activities, the prevention of gravity-produced subluxation at the shoulder joint and severe flexion of the wrist of the affected upper limb is required by the use of some type of shoulder-arm sling or support.

In my experience with currently used slings conventionally styled or individually fabricated, the production of excessive pressure behind the neck of the patient is a serious disadvantage. Besides the discomfort of pressure, the force upon the cervical structures causes an exaggerated hyperextension of the cervical spine and a tendency to kyphosis in the upper dorsal spine.

To relieve the pressure, the patient loosens the fit of the sling which then places the weight strain upon the shoulder and thereby off the neck. This circumstance, of course, nullifies most of the value of the sling in relieving shoulder capsular strains.

The shoulder sling to be described is an attempt to divert the arm weight from the shoulder capsule to the patient's suprascapular and supraclavicular region, and, thereby avoid the problems of neck pressure.

The constituent parts of the suspender-like sling are:

1. A waist band — 2"-wide heavy grade webbing.
2. Vertical back strap — 2"-wide light grade webbing.

3. Two shoulder straps — 2"-wide light grade webbing.
4. Two loops; one for elbow, one for hand — 2"-wide light grade webbing.
5. Two buckles; one for waist band at front, one for attaching vertical strap to waist band in the back (see fig. 1).

The angular spread of the shoulder straps is a critical measurement (fig. 2). To measure this, the axis of the goniometer is placed against the center of the patient's back at about the level of the seventh thoracic vertebrae, or on level with the inferior angles of the scapulae. The goniometer arms are then directed toward the outer edges of the patient's shoulders. This is the angle at which the shoulder straps will be sewn to the vertical back strap. If this angle is not sufficiently wide, the shoulder straps may bear against the lower neck rather than over the mid-shoulder region.

The loops should be sufficiently large to accommodate the girth of the arm



Fig. 1 — Layout view seen from front.

Senior Physical Therapist, Department of Physical Medicine and Rehabilitation, Long Island Jewish Hospital.



Fig. 2 — Back view, at C a self-adjusting ring was used to insure correct angle of spread. Notice how location of shoulder straps avoid cervical region. Buckle at D adjusts level of strap junction at C.

just below the elbow and the breadth of the hand. (fig. 3).

The sling in actual use may have insufficient fixation at the waist and/or at the elbow loop in individual cases. The waist belt may tend to ride upward (particularly in the back) due to traction from the weight of the affected arm; tightening the fit helps to reduce this. However, the more expansive patients may not tolerate abdominal compression well. By lining the inner surface of the waist belt with rubber taping (used conventionally inside trouser and skirt waistbands) less tightness in the adjustment will be possible without much upward riding.



Fig. 3 — Front view, loops A and B are of sufficient size to easily accommodate the hand and elbow of the affected arm. Adjustable belt buckle at E.

If the elbow loop shifts toward the wrist, the line of pull of the shoulder strap deviates too far from the long axis of the humerus; consequently, support and stabilization of the shoulder joint is reduced or actually nullified. A short strip of taping sewn inside the loop where the elbow rests eliminates this problem.

Averting traction trauma to the hemiplegic's shoulder very often depends solely upon the patient's ability to wear his sling comfortably. The suspender type sling described was devised for use in such a condition. It appeared to serve this purpose effectively.

Acknowledgment: The author is grateful for the helpful suggestions and aid given by Joseph G. Benton, M.D. and Miss Carol Nugent, O.T.R.

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The Nation's Classroom

Philadelphia has a fair claim to being the nation's classroom. Since Colonial days, Americans have been coming here for a college education.

Here are such fine institutions as the University of Pennsylvania, Temple University, Drexel Institute of Technology and St. Joseph's, LaSalle and Chestnut Hill Colleges. Besides the medical schools of Pennsylvania and Temple, the city can boast of Jefferson Medical College, Hahnemann Medical College, and the Women's Medical College of Pennsylvania. Here, too, are such specialized schools as the Philadelphia Textile Institute, Philadelphia College of Pharmacy and Science, Curtis Institute of Music and the Pennsylvania State College of Optometry. Nearby are Villanova University, Bryn Mawr, Haverford, Swarthmore and Rosemont Colleges — and others.

To Philadelphia's colleges and universities, every year brings an influx of young men and women from all the American states and territories and some sixty-five foreign lands. When they leave, it is as teachers, engineers, doctors, lawyers, business administrators, veterinarians, scientists, and scholars.

Oldest of the group is the University of Pennsylvania, whose urban campus is one of the approaches to the Philadelphia Convention Hall. It dates its beginnings from 1740 and honors Benjamin Franklin as its founder. Here were developed many firsts in American science and education. In modern times, the University's Moore School of Electrical Engineering designed and built the world's first large-scale general purpose, all-electronic digital computer. The University was first to use closed-circuit color TV to demonstrate medical and veterinary surgery, and first to televise a "live"

surgical operation to home viewers. Such pioneering runs throughout the University's history. A curriculum that it introduced in 1756 has been called the first modern liberal arts course. At a time when college curricula elsewhere were predominantly classical and shaped to the needs of divinity students, Provost William Smith fashioned a blueprint for liberal education. It included such innovations as political science, economics, modern history and the entire range of the physical sciences. North America's first medical school was established here in 1765. Later the University was to have the Nation's first teaching hospital, first university departments of hygiene, public health and research medicine, and the first comprehensive graduate school of medicine.

In 1779, Pennsylvania became the first institution in the U. S. to be named a university. After having been known as a "Charity School," "Academy" and "College and Academy of Philadelphia," it officially became the "University of the State of Pennsylvania." It is not a State university, however, and since 1791 its name has been the University of Pennsylvania.

The first experiments in burning hard coal as fuel were conducted at the University in the late 18th century by Professor James Woodhouse, whose colleague, Professor Robert Hare, invented the oxyhydrogen blowpipe. The first use of ether as an anesthetic during surgery has been credited to Dr. Crawford W. Long, who was graduated from the University in 1839. The first president of the American Medical Association and twenty later AMA presidents have been alumni of Pennsylvania's School of Medicine. The first major American archaeological excavations in the Near East were begun by the University Museum in 1888, and have accounted for

most of the world's known literature in Sumerian, the oldest known written language. The world's first psychological clinic was established at the University in 1896. In the same year, America's first collegiate student union building was erected on the campus. The first developer of tungsten, widely used in electrical apparatus, was the late Provost Edgar Fahs Smith of the University.

Research totaling \$6,000,000 annually in volume is being performed in the University's laboratories. The projects range in magnitude from the nucleus of the atom — nature in its smallest form — to the skies beyond the solar system. Out of this quest for new knowledge may come "firsts" yet unconceived.

A Visit at Valley Forge

If General George Washington's determined, hard-bitten fighting men were alive today and revisited the Valley Forge battlefields where they encamped during the bitter winter of 1777-78, they could pick out the very cannon they tended, the earthen entrenchments they helped dig, and they could come to attention before their great leader at his very desk in his farm-house headquarters.

All these landmarks are still there, just as the soldiers left them. They have been preserved by the State of Pennsylvania as a reminder to every American man, woman and child of their forefathers' great sacrifices to make the United States a free nation and as a further reminder to today's free men to cherish the privileges of the American way of life.

Valley Forge today is 1,500 acres of beautiful parkland, of shady woods and grass-covered hills. Its famed dogwood grove which blossoms in clouds of pink and white is a mid-May mecca. But when the visitors walk along the twisting paths or drive along the well paved, winding avenues, each marked to identify the regiment that encamped along it, a feeling of sadness and pride, too, will come over them as they remember the great history attached to the place.

It was here, you recall, that Washington brought his 11,000 man Continental Army to rest and reorganize for the battles to come. But after that bitter

winter of deep snows, hunger and sickness, 3,000 of those gallant soldiers were left forever behind.

No battles were fought here; the army merely encamped on the site, watchful of the British who waited snug and well-fed in Philadelphia, a scant 18 miles away. That winter period proved, however, to be the turning point of the Revolution because the army that was expected to fall apart here was instead fused by suffering into a united force.

When the British Army occupied Philadelphia in 1777, the main body of the Continental Army under General Washington, retired to Pennypacker Mills on the Perkiomen Creek. The colonial soldiers then advanced to Germantown on October 4 and made a surprise attack on the British encamped there. The attack was partially successful with the British being driven back about three miles before finally forcing the Americans to withdraw to White Marsh, where on December 7 they were attacked by the enemy. But having been forewarned, they fought off the British.

On December 12, with winter setting in and supplies of all kinds running low, Washington took his men to Valley Forge, crossing the Schuylkill River over a bridge of wagons. By December 19 winter held the area in a fierce, unrelenting grip, and beleaguered men started throwing up log huts after Washington and his officers decided their best move was to encamp there for the wintry months.

The men were hungry, ragged, and many actually without shoes were forced to stand in their hats to keep their feet from freezing. Many others weren't fortunate enough to live in huts but depended upon flimsy tents to protect them against the bitter cold. But they endured these hardships, evacuating Valley Forge on June 18, 1778, to march on to victory.

The huts, entrenchments and Washington's farm-house headquarters, the home of Isaac Potts, a Quaker preacher and miller, still remain. The house as well as the battlefields, now known as Valley Forge Park, are visited annually by hundreds of thousands of Americans and people from foreign lands.

The park is dotted with statues of great generals of that day. Plaques are conveniently placed to inform the visitor. The observatory or look-out tower still stands at the top of the high hills and from this vantage point the visitor can view the entire park and miles of surrounding territory.

Another beautiful site at the park is

the Washington Memorial Chapel with its exquisite stained glass windows and quaint interior. Equally beautiful are the melodies played on the Chapel's carillon. The visitors who are present when it plays the Star Spangled Banner will certainly never have heard the country's national anthem in more stirring surroundings.

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Archives of Physical Medicine and Rehabilitation

Who?

What?

Where?

When?

Why?

book reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

CONSTRUCTION MANUAL FOR THE U. S. NAVY: FLEXIBLE SOFT SOCKET FOR UPPER EXTREMITY PROSTHESIS. By Capt. Thomas J. Canty, MC, USN. Paper. Pp. 90. The Laboratory, U. S. Naval Hospital, Oakland 14, 1957.

The production methods as described in this manual are written in such a concise and detailed manner that they can well serve as a guide book for all those who will be called upon to construct prostheses for this type of amputation. The book is well illustrated and is written in an easy-to-follow step-by-step style. It gives clear instructions on fabrication methods for prostheses needed for all levels of amputation of the upper extremities.

The materials recommended are well investigated and have been proved by many years for use of lower extremity prostheses.

The author is an outstanding authority in the field of amputee rehabilitation and as chief of one of the leading prosthetic shops is well aware of the shortage of skilled labor. It is for this type of technician that the book is of greatest value by virtue of its great detail. It is of benefit too, however, to all prosthetists because it follows sound engineering and prosthetic principles. (Donald A. Coualt, M.D.)

TEXTBOOK OF HUMAN ANATOMY. Edited by W. J. Hamilton, M.D. Cloth. Price, \$16.50. Pp. 1022, with illustrations. St. Martin's Press, Inc., 103 Park Ave., New York 17, 1956.

In the preface of this book, the authors answer the question, "Is there need for yet another textbook of anatomy?" There are three major reasons. The first arises from the progressive expansion of the medical curriculum. For this reason it is necessary to reduce some of the factual knowledge which the medical student is called upon to acquire and to attempt to choose that which can give basic information without some of the detail previously emphasized. Secondly is the need for a closer correlation between the study of structure and function. This is accomplished by radiological method; by noting changes in structure of the living tissues, recognizing function, physiology and chemistry and discussing these in connection with the description of the macroscopic and microscopic anatomy. Thirdly, anatomy is not merely part of the

medical curriculum, but also an independent branch of biological science. The student should be introduced to the wider biological implications of his anatomical studies, and should be induced to realize that what he is learning is significant other than vocational.

The book is beautifully illustrated. For instance, where radiological views can give a clear interpretation to show arrangement of trabeculae to demonstrate the activity of the gastrointestinal tract, they are used. Illustrations of macroscopic and microscopic anatomy are on the same or immediate pages as the radiological pictures.

Interest is growing in the development of collagen fibers and other fibers. The fibroblasts and the various cells from which they may come, and the ground substance are described not only anatomically but from the standpoint of physiology as well. The locomotor system is considered as a whole, skeleton, joints and muscles—their development, physiology and function. Aside from excellent illustrations demonstrating individual bones, joints, muscles, many illustrations are drawn against the shadowed background of the body giving a beautiful topographical view.

Since this is a textbook, the anatomy of the entire body is described but the illustrations, together with the discussion of physiology and function, make it particularly valuable. It should be examined by physiatrists as the approach is one that should be of especial interest to them. (Frances Baker, M.D.)

BIOLOGY OF THE LABORATORY MOUSE. Edited by George D. Snell. Cloth. Price, \$6.00. Pp. 497, with illustrations. Dover Publications, Inc., 920 Broadway, New York 10, 1956.

The new edition of this sound monograph on the faithful laboratory mouse gives an indispensable assembly of facts to any research student who may use the mouse in any phase of his work. Much information formerly scattered through the literature has been assembled here by a group of scientists who have achieved high positions of authority in research in biology, genetics, endocrinology and cancer. Parasitic diseases and measures of their control are described by Walter E. Heston; infectious diseases by John H.

Dingle; embryology and mutations by the editor, George D. Snell, and the genetics of spontaneous tumor formation and of tumor transplantation by C. C. Little.

Much of the material gathered in this one volume has acquired the quality of the classical, even in this day of rapid changes in the life sciences and medicine. The section dealing with spontaneous neoplasms in mice, by Arthur M. Cloudman, is essential to any understanding of tumor research, and casts much light on the behaviour of transplanted tumor cells in this host. John Bittner's contribution on the milk influence in tumor formation is well presented as a basic consideration for oncologists, and Elizabeth Fekete has detailed the histology in remarkable completeness, an excellent guide to studies of any variation from the normal.

The library of any medical school or research institute would be incomplete without this classic. (*Arthur C. Jones, M.D.*)

INDUSTRIAL DEAFNESS. Hearing, Testing and Noise Measurement. By *Joseph Sataloff, M.D.* Cloth. Price, \$8.00. Pp. 333, with illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, 1956.

To most medical men interested in industrial rehabilitation such a complete reference on auditory disability is needed. Its chapters on "Physics of Sound," "How the Ear Functions" and the "Effects of Noise on Human Behavior," as well as the description of the various tests for hearing, are of value. The simplified explanations of the causes, prevention, treatment and rehabilitation of hearing loss are both interesting and instructive reading. It is a book that is a valuable addition to a library on medical subjects as well as for one dealing with industry. (*Jacob L. Rudd, M.D.*)

GUIDE TO MEDICAL WRITING. A Practical Manual for Physicians, Dentists, Nurses, Pharmacists. By *Henry A. Davidson, M.D.* Cloth. Price, \$5.00. Pp. 338. The Ronald Press Co., 15 E. 26th St., New York 10, 1957.

Written by an author who has had a great deal of experience with the editorial blue pencil, both as victim and wielder, this book provides sound advice to the neophyte as well as to the "published" author. Although primarily useful as a reference manual, the book deserves a complete and careful reading because its agile and completely lucid style serves as a good example of the principles set forth in the text. For the most part, the author wisely avoids detailed discussion on rules of style that vary in direct proportion to the addresses of publishers. He recommends

a style that would be acceptable to all sources of publication. The book begins with the problem of starting an article, deals with the various difficulties encountered in writing, and ends with the selection of an appropriate source of publication. It shows how to pin down ideas, how to organize subject matter, how to select titles, and how to avoid jargon, triteness, and dullness. Also provided are dosage conversion tables, generic equivalents of trade names, and an extensive list of periodicals in the medical field. (*M. J. D.*)

CONCISE ANATOMY. By *Linden F. Edwards, Ph.D.* Second edition. Price, \$7.50. Pp. 502, with illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, 1956.

Edwards has compiled a concise anatomy, so arranged as to facilitate the study of the various regions of the body, each area or part being treated in sequence as to osteology, musculature, then articulations, and finally the vessels and nerves. There is an initial discussion of general anatomy which includes microscopic anatomy, cytology and embryology, general osteology, arthrology and myology, also descriptions of the nervous system, the vascular system and the skin. Each chapter ends with a consideration of applied anatomy of the system or region, and these sections represent some of the most useful features of this text for teaching purposes.

The descriptions of morphological structures and relationships are very well and clearly given, with parenthetical interpretations of many of the Latin or Greek root words, and a refreshing freedom from the classical "anatomese" verbosity which often obscures rather than clarifies such expositions. Latinized endings are deleted for the most part, being replaced by Anglicized forms throughout. The author has gone to considerable effort to make the text readable and understandable and he has achieved remarkable success in this effort. His book is well adapted to the teaching of anatomy at any level, and especially fitting for classes of therapists, nurses and students majoring in physical education. Medical students can find a source of anatomical fact which should be a welcome change from the heavier reading of the traditional textbooks.

It is unfortunate that some of the illustrations are reprints of cuts which have been used to the point that they reproduce rather poorly, thus reducing their usefulness. Other plates are of very good quality, however, and criticism cannot be made of the descriptive material, which is excellent throughout the book.

The author has succeeded in presenting an anatomy which is truly concise, and which is especially adaptable to teaching of physical and occupational therapists, or to use as a

reference text by the busy physician who wishes to find pertinent facts about a region without undue loss of time. (*Arthur C. Jones, M.D.*)

ANNUAL REVIEW OF PHYSIOLOGY. Vol. 19. Edited by *Victor E. Hall*. Cloth. Price, \$7.00. Pp. 639. Annual Reviews Inc., Grant Ave., Palo Alto, Calif., 1957.

Review volumes of this type serve not only to bring together the recent material on selected topics for the expert or near-expert; they also indicate to the less specialized reader some of the trends in investigation which he would not encounter elsewhere. The renewed emphasis on cellular physiology is to be noted in several chapters, i.e., those on transport through biological membranes and on heat and cold. The breakdown of boundaries between biophysics, chemistry, pharmacology and physiology is to be noted almost throughout. Especially timely are the chapters on hypothermia and radiation effects on mammals. The first of a projected series on developments in Russian physiology, on neurophysiology, is of both general and specialized interest. Two other chapters on the nervous system illustrate the increasingly fundamental developments in neurophysiology.

The tasks of the reviewing contributors, to be reasonably comprehensive and still to include some interpretive text, are not easy. As might be expected, they achieve variable success. Even the least successful, however, is much more than a catalogue of the literature. Active research workers will find in at least a few chapters a ready and rapid survey of those subjects which bear upon their special interest. The student embarking on a new physiologic subject of interest may find a handy start toward comprehensive knowledge of current status of a subject. The clinician or the clinical investigator may discover greater breadth of understanding, even by skimming the chapters relating to his interest. (*Robert Darling, M.D.*)

PERSONALITY, STRESS AND TUBERCULOSIS. Edited by *Phineas J. Sparer, M.D.* Cloth. Price, \$12.50. Pp. 629. International Universities Press, 227 W. 13 St., New York 11, 1956.

Along with current developments in the management of tuberculosis, this book makes its first appearance wherein the psychological manifestations of tuberculosis are brought to light. Under one cover many fine authors have given of their best in discussing the various facets of psychology and psychiatry in relationship to the tuberculous patient's adjustment to disease. It becomes clearly evident

from the discussion that tuberculosis must be treated comprehensively and sustained throughout the course of illness. This volume is a credit to the editor for pleasant and enjoyable reading. The references quoted provide additional sources of information for the student. (*Herbert Kent, M.D.*)

CLINICAL EXAMINATIONS IN NEUROLOGY. Sections of Neurology and Section of Physiology. By Members of the Sections of Neurology and Section of Physiology, Mayo Clinic and Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota, Rochester, Minn. Cloth. Price, \$7.50. Pp. 370, with 76 illustrations. W. B. Saunders Co., West Washington Sq., Philadelphia 5, 1956.

One of the key aspects of training in the field of Neurology is learning correct and thorough neurological examination. This book is eminently successful in providing an essential guide for this training. In addition to describing the technics of neurological examination, important correlative anatomical and physiological data are included as well as clinical orientation.

The section on electromyography and electric stimulation of peripheral nerve and muscle is probably the most authoritative discussion available at this time. This section alone will make the text of great value to the readers of this journal.

The recording forms used at the Mayo Clinic are enclosed and should be very useful in guiding all physicians seeking proficiency in this field. This book stands in a class by itself among textbooks in neurology and fills a definite need. (*Arthur L. Watkins, M.D.*)

CLINICAL USE OF RADIOISOTOPES. By *Wm. H. Beierwaltes, M.D.*; *Philip C. Johnson, M.D.*, and *Arthur J. Solari, B.S.* Cloth. Price, \$11.50. Pp. 456, with illustrations. W. B. Saunders Co., W. Washington Square, Philadelphia 5, 1957.

This book is based on the text for a course which was started in 1947 at the Clinical Radioisotope Unit of the University of Michigan. The experience gained in the training of technicians and residents from the departments of radiology, medicine and surgery is reflected not only in an excellent presentation of the clinical use of isotopes but also in many practical suggestions. Among these are chapters with such titles as "Who should train?", "Starting and managing a clinical radioisotope unit", "Expenses and income", "Interested colleagues", "Physician or physicist", "Formal clinical radioisotopes training courses."

The presentation of the physical side of radioisotopes and their practical use is somewhat uneven and scattered throughout the book. The first chapter, "Certain preliminaries," contains fundamental descriptions on measurement of radioactivity, interaction of radiation and matter, half-life calculations (with a series of confusing formulas, due to typographical errors), units, radiation detectors and problems in counting. This first chapter is followed by ten chapters on biological and clinical aspects of the use of isotopes. Chapter 12 deals again with physical problems, such as radiation hazards, protection, waste disposal, contamination, etc. Chapter 13 describes in great detail the instrumentation used in a clinical radioisotope unit.

The authors state in the preface that "the space devoted to each subject is weighted largely according to the popularity of each use." This is best illustrated by the fact that about one-half of the book is devoted to uses of that clinically still ideal isotope iodine-131. Thyroid physiology, tracer techniques, diagnosis and treatment of thyroid neoplasms are described in great detail. All other clinical tests and treatments with isotopes phosphorus-32, gold-198, chromium-51, cobalt-60, iron-55 and iron-59 and quite a number of less commonly used ones are equally well presented. An important chapter on biological effects of radiations closes the clinical part of the book. The reference lists for the clinical chapters are thoroughly adequate while those for the physical chapters are insufficient and partly obsolete. The book can be recommended to everyone who uses radioisotopes; it is especially useful for the beginner. (*Otto Glasser, Ph.D.*)

OCCUPATIONAL THERAPY. PRINCIPLES AND PRACTICE. Second edition. Edited by *William Rush Dunton, Jr., M.D.*, and *Sidney Licht, M.D.* Cloth. Price, \$8.00. Pp. 373. Charles C Thomas Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1957.

Dunton and Licht have made a significant contribution in editing one of the few textbooks which covers the entire field of occupational therapy.

The book is noteworthy in that it is easily readable, and covers a diversity of areas such as tuberculosis, cardiac disease and psychiatric conditions. Unfortunately, the book consists of a compilation of technics with few principles presented. Occupational therapy is a professional discipline closely allied to the medical specialty of physical medicine and rehabilitation. There are biologic principles upon which the field of occupational therapy has developed.

It is time that this discipline were viewed in the light of the physiologic principles upon

which it is based. Too often, it is still presented as a collection of technics such as one might obtain in an omnibus on home improvement. It is incumbent upon psychiatrists to present the field to our medical colleagues in a manner which they can recognize as a professional discipline. Perhaps, it is as important for occupational therapists to interpret their professional role in this framework. (*Jerome S. Tobis, M.D.*)

ORTHOPAEDIC NURSING. Second edition. By *Mary Powell.* Cloth. Price, \$6.00. Pp. 440, with illustrations. E. & S. Livingstone, Ltd., Edinburgh, Scotland, 1956.

This book includes nearly all the wide variety of orthopedic subjects encountered in a hospital and deals with each briefly, and, in most instances, in sufficient detail for the needs of the overworked teachers and student nurses.

In the preface a statement is made to the effect that the conquest of tuberculosis has been accomplished by antibiotics. Much progress has been made in this disease because of streptomycin, PAS, isoniazid, etc., but the statement that the disease has been conquered is a bit too optimistic for the present.

More might be said about the role of nursing in sacro-iliac strain and lumbo-sacral strain. The reviewer does not agree that it is essential the "physiotherapist" for orthopedic nursing be "a trained orthopedic nurse." Aside from a few minor disagreements the book is well written, excellently illustrated and very practical. (*Jacob L. Rudd, M.D.*)

KÖRPERLICHE UND GEISTIGE EIGENSCHAFTEN ZUM FÜHREN VON KRAFTFAHRZEUGEN BEI HIRNVERLETZTEN. By *Dr. Med. Artur Grossjohann.* Paper. Price, \$0.80. Pp. 84. Georg Thieme Verlag, Stuttgart, Germany, 1957.

The ten sections of this book deal with the following subjects: the demands made by modern traffic on the driver of a motor vehicle; methods used for testing the work-capacity and personality structure of an applicant; symptoms of brain injury; significance of the symptoms of brain injury as determining the fitness of drivers; results of evaluating applicants with brain injuries at the Medico-Psychological Institute for Traffic Safety of the Technical Supervisory Association in Stuttgart; reasons for inadequacy in drivers; evaluation of the results of the testing program; case histories; conclusions, and bibliography.

Some patients came for examination as applicants for licenses; others came after traffic incidents for opinions as to the part their handicaps might have played. The patients usually presented the chronic residual

of mild injuries to the frontal or temporal lobes; patients with other types of lesion, in severe form, or in the acute stage were rarely seen. The severity of the neuropsychiatric symptoms could not be judged from the appearance of the cranium. Severe disabilities were found in some instances after apparently trivial cranial damage, while extensive cranial defects were sometimes unaccompanied by any neuropsychiatric symptoms. The strongest correlation existed between the duration of unconsciousness after the initial trauma and the severity of the subsequent disabilities. Physical disabilities were sometimes significant, but in general the mental disabilities were decisive; these included impaired vision, narrowing of the visual fields, impaired ability to interpret visual cues, shortened attention-span, impaired intelligence, inadequate self-criticism, slowing of reactions, indecisiveness, error-proneness, inability to learn, liability to panic, pareses, emotional instability, and sensitiveness to noise. About 20 per cent of these persons had spells of some kind. Traumatic epilepsy should be recognized as a possibility in any patient who has a history of prolonged unconsciousness after an open skull fracture in the frontal or temporal region.

The over-all results were that about one-third of the applicants tested were found fully qualified to drive motor vehicles in city traffic. An additional significant number of applicants could drive safely in particular situations that did not make excessive demands; it is desirable for their sake and for the good of society that such persons be enabled to work within the sphere of their limitations.

It is pointed out that the decisions of law courts in accident cases have little or no value to the physician interested in rehabilitating the patient; the efforts of the real culprit to escape blame, the considerations of monetary damage claims, and the complexity of the compensation laws may lead to decisions quite different from those a physician would reach on the basis of objective anatomical and physiological data. In any case, it is recommended that persons with brain-injuries causing more than 50 per cent loss of vocational ability be given a thorough examination before being licensed to drive motor vehicles. (*Frederic T. Jung, M.D.*)

ALCOHOLISM. A Manual for Students and Practitioners. By *Lincoln Williams, M.R.C.S.* Cloth. Price, \$3.00. Pp. 60. The Williams & Wilkins Co., Mt. Royal and Guilford Aves., Baltimore 2, 1956.

The stated purpose of this book is to stimulate interest in the etiology, diagnosis, and treatment of alcoholism. It is a brief review of the literature on the subject, particularly that dealing with a description of the disease and methods of treatment, and

contains a representative bibliography. The book seems to be directed to those physicians who regard an alcoholic as unworthy of medical treatment. Unfortunately it is dotted with some robust drinking songs that remind the reader of the humorous aspects of alcoholism, which is quite foreign to the author's stated purpose. (*M. J. D.*)

GENERAL UROLOGY. By *Donald R. Smith, M.D.* Paper. Price, \$4.50. Pp. 328, with illustrations. Lange Medical Publications, Los Altos, Calif., 1957.

This is one of the series of concise books written for the general practitioner and medical student.

It begins with a brief review of the anatomy of the genito-urinary tract, followed with a review of genito-urinary symptoms, including local, referred, gastro-intestinal, urinary and sexual. The main body of the book considers the clinical phases of genito-urinary disease and injury in rather complete detail. Special mention should be made of chapter 14 in which the "neurogenic bladder" is thoroughly discussed. The last chapters are devoted to such interesting subjects as intersexuality, renal hypertension, infertility and psychosomatic urologic syndromes. A brief appendix lists material and equipment for urologic use. The index is adequate.

The publisher should be commended for putting out these inexpensive medical volumes and should be encouraged to publish more. (*Harry T. Zankel, M.D.*)

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- "Employment Outlook for Physical Therapists: A Survey of Salary and Personnel Policies" by Augustin & Ehmann. (Reprint from August, 1957 Archives of Physical Medicine and Rehabilitation)
- American Registry of Physical Therapists: Booklet of Information.
- Guide Law: An Act Defining and Regulating Physical Therapy, etc.
- By-Laws of the American Registry of Physical Therapists.

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physical medicine abstracts

The Pattern of Response of Pulmonary and Systemic Arterial Pressure in New-born and Older Infants to Short Periods of Hypoxia. L. S. James, and Richard B. Rowe. *J. Pediat.* 51:5 (July) 1957.

The authors studied two groups of infants who were resting quietly or sleeping, breathing 10 per cent oxygen and 90 per cent nitrogen for six minutes. Group One consisted of eight infants between one and nine months of age. Group Two consisted of five infants aged two to eleven days of age.

In Group One, hypoxia produced an average fall in arterial oxygen saturation of 30 per cent below control values. There was an associated rise in the mean pulmonary artery pressure of 44 per cent of basal pressure. Systemic arterial pressures did not vary significantly from basal levels.

In Group Two, hypoxia produced an average fall in arterial oxygen saturation of 55 per cent. There was an associated average rise in mean pulmonary artery pressure of 17 per cent, with a mean systemic arterial pressure fall averaging 21 per cent. This is interpreted as indicating a shunt of venous blood through the foramen ovale and patent ductus into the systemic circulation.

One infant in Group Two was given 15 per cent oxygen to breathe, showing a 20 to 27 per cent fall in systemic arterial oxygen saturation associated with a 20 per cent increase in the pulmonary artery pressure on one occasion, but no change on a second examination. This infant showed no significant change in systemic arterial pressure.

All infants in this study showed rapid rise in arterial oxygen saturation, and fall in pulmonary artery pressure with 100 per cent oxygen to breathe. Hypoxia with arterial oxygen saturation as low as 50 per cent was associated with mild somnolence. Saturations of 40-50 per cent were associated with restlessness, movement, strenuous crying and sometimes gasping crying. Skin color was not a good indication of the degree of desaturation since pallor was more the rule than cyanosis.

Syndrome of Vertebral Artery Compression. W. F. Tatlow, and H. G. Bammer. *Neurology* 7:331 (May) 1957.

Three cases are presented demonstrating dizziness and nystagmus associated with rotation of the neck. A Stryker bed was used

to study the effects of turning the entire body of the patients compared to turning the neck or the trunk only. It was noted that these and other symptoms disappeared or improved when the patients were maintained on adequate anticoagulant therapy. The vertebral arteries in cadavers were injected with a radiopaque substance and then radiographic pictures were taken. These pictures demonstrated that the vertebral artery can be markedly narrowed by neck rotation.

Immunohistochemical Study of Lesions in Rheumatic Fever, Systemic Lupus Erythematosus and Rheumatoid Arthritis. Jacinto J. Vazquez, and Frank J. Dixon. *Lab. Invest.* 6:205 (May-June) 1957.

Fluorescent antibody studies were performed to determine the relative concentrations of gamma globulin and albumin in various tissues.

Preferential concentration of gamma globulin was demonstrated in the altered perivascular tissues in rheumatic fever, although visually it was not possible to demonstrate a difference between the amount of gamma globulin within the fibrinoid degeneration of Aschoff bodies and in the immediately surrounding edematous connective tissue.

In lupus erythematosus, gamma globulin was demonstrated in the altered perivascular tissues, in walls of arterioles of the kidney, in the thickened basement membranes of "wire loop" lesions of glomeruli, in typical L. E. cells, and in so-called free bodies in peripheral blood. The subcutaneous nodules of rheumatoid arthritis showed the presence of gamma globulin.

No preferential staining appeared in sections of myocardial fibrosis following infarction, arteriosclerotic hearts, acute myocardial infarction with necrosis, renal cortical necrosis, diabetic glomerulosclerosis, or arterio-nephrosclerosis.

In the acute inflammatory processes studied, acute appendicitis and pyelonephritis, larger amounts of albumin than of globulin were shown.

The mechanism of deposition of gamma globulin in these tissues was not demonstrated. However, the authors speculate that autoantibodies, heteroantibodies or non-immunologic factors may be responsible.

Sympathectomies in Peripheral Vascular Diseases: Follow-up Studies to Twenty Years. R. J. Popkin. *Angiology* 8:156 (Apr.) 1957.

The author reports on 108 consecutive sympathectomies for various peripheral vascular diseases seen by him over a ten-year period from 1946 to 1955. All cases were seen both before and after surgery.

The follow-up included 60 cases of arteriosclerosis obliterans, and 29 cases of thromboangitis obliterans. The ratio of males to females was three to one and the age at the time of surgery ranged from 43 to 76 years. The arteriosclerotic patients all had lumbar sympathectomies and the majority of the thromboangitis obliterans cases had both lumbar and cervical sympathectomies. Reynaud's syndrome and scleroderma were treated chiefly by cervical sympathectomies.

The author feels that in such occlusive diseases as arteriosclerosis obliterans and thromboangitis obliterans surgery was beneficial only when vasospasm was a dominant factor. Intermittent claudication was rarely benefited and no case of thromboangitis obliterans improved if the patient continued to smoke.

Bruised Tissue. I. Biochemical Changes Resulting from Blunt Injury. Mostafa Hamdy; Fred E. Deatherage, and George Y. Shinowara. *Proc. Soc. Exper. Biol. & Med.* 95:255 (June) 1957.

This paper is a study of some of the physical and biochemical changes occurring during the healing process in bruised tissue. Areas to be bruised and symmetrically located control areas were clipped and shaved on 55 cattle. Injury was inflicted by two blows from a seven-pound sledge hammer falling three feet in one-half second. At various intervals over a nine-day period the cattle were slaughtered and the bruised and control areas were excised, minced and subjected to various chemical and physical studies.

The greatest swelling and fluid volume in the bruised areas occurred within two days. The mean concentration of iron ("easily split iron") doubled in four to five days and then decreased to reach the control level in seven to nine days at which time the bruise had healed. Non-protein nitrogen dropped to one-fourth of the control level in four to five days, but rose abruptly to the control value by the ninth day. On the fifth day there was a ten-fold increase in red pigment, chiefly extra-stromal hemoglobin. Bilirubin concentration paralleled the increase in red pigment.

In general, although healing was grossly evident in seven days, biochemical values did not return completely to the control levels until the ninth day.

Clinical Evaluation of Scoliosis. J. C. Risser. *J.A.M.A.* 164:135 (May 11) 1957.

Examination of a patient while he is bending forward is important in early recognition of scoliosis. If there is only slight asymmetry in this position and the curvature of the spine is ten degrees or less, much can be accomplished with stretching and exercises. If the curvature is 25 degrees or more correction is only possible with traction and lateral bend, as in a turnbuckle cast or localizer cast. A localizer cast has the advantage of being able to have the patient ambulatory at all times except for the seven to ten days after surgery. With scoliosis the most increase of deformity of the spine occurs during the period of rapid vertebral growth from 11 to 15 years of age unless it is corrected. The average amount of correction is 25 degrees. To maintain correction, surgical immobilization of the entire area of the curve is necessary. After surgery the patient must be again immobilized in a cast. The total period of immobilization following surgery is eight to ten months.

Variable Resistance Bicycle Ergometer for Performance of Recumbent Exercise. Salvatore M. Sanecette, and Richard J. Carleton, Jr. *Rev. Scient. Instruments* 28:125 (Feb.) 1957.

The authors describe the construction and performance details of an eddy-current dynamometer made from a six-volt automotive generator. The field excitation coil is supplied with a separate power source, variable from 0 to 20 volts. The carbon brushes are removed, commutator bars shorted, and the current generated is shorted and dissipated through the rotating armature. The apparatus is reported to have the advantage of easy operation, little opportunity for error, and linearity through wide ranges.

Spine Fusion in Young Children. H. Hallock; K. C. Francis, and J. B. Jones. *J. Bone & Joint Surg.* 39-A:481 (June) 1957.

The author reports on a prolonged follow-up of a series of fifteen patients who underwent a Hibbs type of fusion because of tuberculosis of the spine. The shortest follow-up was 12 years and the longest was 31 years, with an average of 21 years.

Roentgenograms in the follow-up period were compared with those of the immediate post-operative period. Measurements were carried out directly on the lateral roentgenograms using the method suggested by Albert Ferguson.

Measurements expressed in comparative percentage change revealed that growth con-

tinged in the fused area but to a lesser degree than in the contiguous normal and unfused vertebrae. Considerable individual variation of growth occurred and the total amount of growth was greater in those who were younger at the time of operation.

Growth in the entire fused area was generally 37 per cent less anteriorly and 55 per cent less in the posterior elements than in the adjoining unfused vertebrae.

Further Evaluation of the Use of Intramedullary Nailing in the Treatment of Gunshot Fractures of the Extremities.
E. A. Brav. *J. Bone & Joint Surg.* 39-A:513 (June) 1957.

Intramedullary fixation of gunshot fractures was used extensively during World War II. Successful use of modified intramedullary nailing during the early months of the Korean conflict was the basis for increasing use of this procedure in gunshot fractures.

The author reviewed 67 cases of intramedullary nailing of gunshot fractures in United States Korean War casualties. The results were graded as excellent where there was both bone union and wound healing, good if there was bone union but intermittent drainage, and poor if there was non-union, severe chronic bone infection, or significant residual disability.

Twenty-eight of the fractures were nailed prior to wound healing. In 25 of these fractures the results were satisfactory. In the group of fractures treated by immediate or slightly delayed wound closure, 14 (87.5%) of the results were satisfactory; and in the group of fractures in which the wounds were left open following nailing, 11 (91.7%) of the results were satisfactory.

An analysis of the failures revealed that in these instances wound closure was carried out in the presence of frank suppuration.

Ultrasonic Energy and Surgically Produced Defects in Bones. N. I. Ardan; J. M. Janes, and J. F. Herrick. *J. Bone & Joint Surg.* 39-A:394 (Apr.) 1957.

Bony defects were surgically produced in the anterior femora of 67 adult dogs. Following complete healing of the surgical wound all the animals received ultrasound to the site of the defect in varying dosages. The opposite extremity of each animal was used as a control. Lateral roentgenograms were made of both femora of each dog approximately every two weeks for two months after exposure and thereafter once monthly until the dog was sacrificed.

Ultrasound was applied to the defect area with a massaging action after the cortex had

achieved a standard temperature as measured by thermocouples which were adjacent to the bone. Four groups of 16 animals each were exposed to the same dose of ultrasound energy, namely 10, 15, 20, and 25 watts of total output. The remaining three dogs were exposed to five watts of power.

A definite delay in the healing of the bone defects was found in 54 of the 64 dogs exposed to 10, 15, 20, and 25 watts of ultrasonic power.

Medullary fibrosis with cortical necrosis was the most common finding with evidence of both endosteal and periosteal new-bone formation seen simultaneously with the cortical necrosis in adjacent areas.

Traction Therapy, A Study of Resistance Forces. B. Judovich, and G. R. Nobel. *Am. J. Surg.* 93:108 (Jan.) 1957.

The purpose of this paper is to offer physical evidence that current methods of traction in bed do not provide sufficient stretch to the spine or its muscles. Not enough weight can be applied by these methods to overcome the surface traction resistance of the body segment over which the force is being applied.

In order to prove this and introduce a new form of traction the authors use a bisected bed with a fixed upper section and a motorized traction unit in the lower section. By placing various parts of the body (the knee, the lower lumbar spine) over the gap in the bed they could measure the force needed to overcome the surface traction resistance of various body segments.

The authors made the following observations:

1. The forces required to overcome the surface traction resistance of the whole body or any part of it are approximately the same—the average being 54 per cent of the weight of the body.

2. The lower body segment (below L3-4 interspace) is about 48 per cent of the body weight.

3. Therefore, 48 times 54 per cent, or 26 per cent of the total body weight is a dissipated force and is completely lost as a stretch force on the lumbar spine in traction. Therefore, in a 200-pound man, 54 pounds is dissipated and yet it would require 106 pounds of weight in Buck's extension to produce this force.

In using this bed for treatment of herniated lumbar discs, the authors initially employ a mild traction equal only to the surface traction resistance. If no relief is obtained, pelvic and counter traction belts were employed and the patient was stretched to the limit of tolerance. As it takes at least 30 pounds to stretch a cervical spine, it was calculated that it must take at least 80 to 100 pounds of direct pull to stretch a lumbar spine. This

amount is generally employed, although many patients can tolerate much more.

Clinical observations suggest that in herniated discs reflex spasm of muscles has little to do with pain production. Sufficient traction, which theoretically might irritate the muscle, and produce more spasm, relieved the pain and spasm in these cases. Thus it seems that it is the pressure of pain sensitive structures that cause reflex muscular spasm, and when traction relieves this painful pressure, spasm ceases.

Fat Embolism: A Problem of Increasing Importance to the Orthopedist and the Internist. J. Love, and W. Stryker. Ann. Int. Med. 46:342 (Feb.) 1957.

The authors present a discussion of the etiology, the pathophysiology, the clinical picture and some therapeutic measures to be employed in post-traumatic fat embolism states.

On the assumption that fat emboli are derived from the marrow, usually of the long bones, three conditions are elicited for their production (1) the envelope of the fat cell must be ruptured and liquid fat freed; (2) veins in the vicinity of the trauma must be torn, and (3) increased pressure must be present to force the fat into the torn veins. Intensification of any one or all of these conditions is produced by churning of the fracture site from prolonged transportation and/or inadequate splinting. The fact that marrow capillaries are approximately two and one-half times the sizes of capillaries elsewhere in the body allows the fat globules to pass readily into systemic circulation. Fat emboli are usually globular and become impinged in the pulmonary capillary tree, but these emboli can elongate, escape the pulmonary bed and migrate elsewhere. Therefore there are multiple sites for terminal location of these lipid bodies.

Clinical findings according to the authors are characteristic. History of severe trauma, usually a fractured long bone is followed by a "free interval." Then nail beds and lips become cyanotic and respiratory rate and depth increase. Restlessness and anxiety may occur progressing to delirium and possibly coma. On the second or third day fine brownish petechiae may appear over the upper trunk, axillae and lateral aspect of trunk. Exact explanation of this phenomenon is lacking.

Differential diagnosis is not difficult with coexistent pulmonary and cerebral signs. Intracranial bleeding may present a problem but in fat embolism there are no localizing or lateralizing signs. Often trephining becomes a necessary expedient in the differential diagnosis. Of note is the predilection of fat embolism in the alcoholic solvent and early differential must be made between embolism and delirium tremens. Shock syndromes not

responding to blood replacement are in reality fat embolism according to the authors. Pulmonary embolus rarely occurs before the tenth day after injury, whereas fat embolus may occur from one to six days after injury.

Treatment is mainly presentative, that is, proper splinting, careful transportation of patient and early definitive reduction and immobilization of fractures. Active therapy includes use of oxygen, preferably under pressure and, according to authors, intravenous five per cent glucose, five per cent alcohol infusion for its emulsifying effect. Heparin is used for its lipolytic effect and low fat diet are adjuncts in therapy. Two illustrative cases were presented by the authors.

Pernicious Anemia in Old Age. A. Burlina. Friuli med. 11:1005-1043 (Nov.-Dec.) 1956 (In Italian) [Udine, Italy].

Burlina describes nine patients, 69 to 86 years old (average age, 77), with pernicious anemia; seven were peasants, and, although they were not well-to-do, they could afford a sufficient diet. The other two were from the city. All patients had had malaria and syphilis. One had been a diabetic for 20 years, and all had had gastric disturbances four to six months before admission. Five patients lived on a poor diet consisting of polenta, cheese, chicory, and wine; two patients because of psychic disturbances refused to eat certain foods, and whatever they ate represented a uniformly poor diet. The other two patients ate and drank normally. The exact time of the onset of the symptoms could be determined in only five patients. The major symptoms were anorexia, perspiration, asthenia, fever, mental confusion, and cardiac decompensation. Anorexia and delirium were the first symptoms in one patient. This patient remained in bed in a dark room for 30 days refusing to see a physician or to take any medicines. One patient had a manic depressive syndrome, and another had severe vertigo. All patients had asthenia and jaundice, and three had marked edema. Three patients were taken to a hospital because of cardiac decompensation, two because of psychic disturbances, one because of vertigo, and three because of asthenia and marked perspiration. The patients were treated with liver extract, vitamin B₁₂, other vitamins of the B complex, including folic acid, and large amounts of vitamin C. Iron sulfate was given by mouth as soon as a reticulocyte crisis was observed. The treatment had a beneficial effect on all patients. The results of all tests returned to normal values. The author believes that pernicious anemia occurs almost exclusively among senile subjects who subsist on a poor diet. Possible association of pernicious anemia with other diseases, such as gastric carcinoma, was not found.

Amputations and Modern Prosthetics. C. L. Compere, and R. G. Thompson. Surg. Clin. North America 37:103 (Feb.) 1957.

Psychologic preparation of the patient for amputation is essential. When possible, the total rehabilitation plan should be formulated and explained prior to amputation.

The majority of amputations are done by general surgeons, with good technic but with lack of knowledge of prosthetic replacement and rehabilitation. Credit is given to the "Prosthetics Research Board" for many advances in development, standardization of surgical technic and revision of previously accepted "sites of election" for amputation. The principles of surgical technic are outlined. The use of a non-constrictive stump-thrinking bandage is advocated and described. Importance is placed upon early exercise programs and care of positioning to maintain strength and prevent contracture. In thigh amputation, the position of flexion and abduction is naturally assumed as a result of muscle imbalance and for comfort. The patient must be specifically warned of the dangers of such positioning.

Selection of the prosthesis must be made in terms of general medical condition, stature, strength, endurance, intelligence, and vocational objectives. Prescriptions should follow consultations with the prosthetist in accordance with the treatment and training facilities. The team approach obviates "buck passing" for failure, and affords the greatest possible success.

In the upper extremity, the old concepts of sites of election are held invalid. All possible length from fingers to shoulder should be retained. Any stump can be fitted including the difficult transcarpal and elbow disarticulations. New terminal devices provide excellent function with voluntary closure, and control of range and force. Functional hands and hooks are available and interchangeable.

In the lower extremities, advances have been made in materials, principles of fitting sockets, and alignment technica. In the foot, all bone should be saved which will permit primary closure of the skin without tension. The Syme amputation is strongly advocated with the single reservation of cosmetic unacceptability in women. The authors state that amputation is to be avoided below six inches distal to the knee. The ideal stump is five and one-half to six inches, but even a two inch stump will be useful in controlling knee function. In the thigh, any length from a knee disarticulation up can be fitted. Amputation three to four inches above the knee is ideal for a suction socket prosthesis. The suspension mechanism of this prosthetic is thought applicable only in cases with good muscle strength, emotional stability, adequate length without longitudinal scars, and geographic proximity to a limb shop. It is specifically contraindicated in old patients with

peripheral vascular disease or coronary artery disease.

The authors conclude that any length, in either the upper or lower extremity, with exception of the distal two-thirds of the lower leg deserves an attempt at prosthetic replacement, and the cooperative efforts of the team in rehabilitation.

Amputations and Amputees — Adult and Juvenile. C. N. Lambert, and A. J. Novotny. Surg. Clin. North America 37:119 (Feb.) 1957.

An evaluation is presented of levels of amputation, in the light of recent developments in prosthetic design, of problems in fitting of prostheses and the functional results to be anticipated. Several factors peculiar to the juvenile amputee are discussed. Whereas, in the adult, frustration is gendered by comparison with the lost limb, the child has not become so habituated to the part, and has not developed so many technical skills. In the child it is imperative to preserve any available stump, no matter how short, since with epiphyseal growth, it may become long enough to be functional. Though bone growth may exceed soft tissue growth, and the bone "grow out" of the stump end, this does not contraindicate replacement, since re-amputation may be well compensated by the use and functional preservation of the part. Congenital amputations can usually be fitted with present devices, and again it is important to "save everything." Lower extremities should be fitted as soon as the child shows a tendency to stand. Upper extremities have been fitted as early as 18 months, and should be fitted not later than one year before entering school.

The selection of level of amputation is discussed comprehensively. Though loss of the great toe is theoretically disabling, the authors find this to be minimal in actuality. Revived interest in transmetatarsal amputation in peripheral vascular disease is noted. This requires exacting care, but when successful it is well worth the effort in terms of disability. The Syme amputation is advocated for its simplicity of fitting, its usefulness without the prosthesis, and is contraindicated in women only on cosmetic grounds. The authors emphasize the need for re-evaluation of the site of below-knee amputation, because of the present work in progress on prostheses which can be suspended entirely below the knee. This will be possible only in low amputations with sufficient muscle mass. Amputation at the level of the junction of the gastrocnemius-soleus muscle and tendon is advocated. Knee disarticulation is advocated for its painless end bearing quality, and has only the cosmetic disadvantage of outside hinges.

In the upper extremity, transmetacarpal amputation is discredited because it is non-functional and difficult to fit. Transcarpal amputation leaves insufficient room for attachment of terminal device and makes the arm longer than that of the opposite side. The upper extremity prosthesis has a lower acceptance rate than the lower, due to its more complex function and lesser relative importance. The arm amputee therefore requires more encouragement and more extensive training.

An excellent discussion of recent advances in fabrication and design of prostheses is offered with detailed description of suction suspension and the quadrangular socket. It is stated that a suction socket can be fitted to "almost any amputee who can be fitted with a prosthesis of any kind." No contraindication is recorded.

The responsibility for prescription and fitting of a prosthesis belongs to the surgeon and should not be left to the prosthetist. Rehabilitation is the joint function of the surgeon, prosthetist, rehabilitation agency, social service, and vocational training center.

The Phantom Limb. Andor A. Weiss. *Ann. Int. Med.* 44:668 (Apr.) 1956.

Problems of the phantom limb may be grossly divided into the so-called "natural phantom," the sensation of the amputated part being present, and the mechanism of phantom pain.

The "natural phantom" consists of a painless sensation of the limb being present, which may be pleasant to the patient. The phantom is never felt as an exact replica of the amputated part and the more distal, highly innervated parts, are more often felt. The duration and intensity of this phantom may be shortened by immersion of the stump, or contralateral limb, in warm or cold water, ethyl chloride spray or procaine to the stump, or change of body posture. Phantom limbs in congenital amputations and in those patients under five years of age have not been reported.

Phantom limb pain is very common in the traumatic and surgically induced amputations. Three mechanisms are presented in the production of such pain: peripheral, central and psychogenic. The hypothesis of peripheral mechanism is that painful afferent stimuli are set up from the stump causing a reverberating circuit from the internuncial pool of neurons, traveling cephalad to the thalamus and thence of the cerebral cortex. A vicious cycle is perpetrated between the thalamus and cortex which is not broken by procedures performed on the end of the stump. Also painful impulses may arise reflexly via the autonomic nervous system producing vasospasm and a reflex sympathetic dystrophy syndrome.

The central theory encompasses the "body image" concept. As a result of various sensations experienced over the years, the individual builds up in his own mind an image of himself in relation to the outside world. The more distal parts of the extremities, being more richly endowed with sensory nerves, have a proportionately greater representation in the body image. This image forms from three components based on sensory, kinesthetic and visual perceptions, the last being least important.

The last concept is the psychogenic theory. Not all phantom limb pain is present in patients who were emotionally unstable prior to amputation, yet loss of function of the extremity definitely has a deterrent psychogenic effect. This effect may be overcome by various technics, such as hypnosis, electroshock and simple psychotherapy. Provision of a prosthesis to increase the function of the amputated part does much to relieve the phantom limb syndrome.

In summary, the phantom limb syndrome seems to include some parts of each theory, with the psychogenic theory being predominant. Therapy includes many physical measures as well as psychotherapy, but restoration of function and elimination of local stump irritation play the biggest roles in the prevention of the painful phantom.

Lactic Acid Accumulation During Work. A Suggested Standardization of Work Classification. J. G. Wells; Bruno Balke, and D. Van Fasson. *J. Appl. Physiol.* 10:51 (Jan.) 1957.

Several attempts have been made in the past to standardize work capacity in regard to pulse rate, blood pressure, oxygen intake, respiratory rate, and pulmonary ventilation.

Lactic acid levels at varying pulse rates were noted in a group of subjects as they performed on a standardized treadmill test. Average resting levels were first determined.

At a pulse rate of 120 beats/min. the oxygen consumption had increased about five times while the lactic acid level was still within normal limits. Between pulse rates of 120 to 160, the lactic acid in the blood accumulated in a linear relationship with the increase of work intensity up to a value of 38 mg. per cent. During this interval the oxygen consumption increased approximately ten times normal resting values. During a continuation of exercise, a sharp increase in lactic acid occurred, the terminal value being 93.5 mg. per cent at a pulse rate of 191 beats/min.

The authors classify work into three categories, (1) light work — pulse rate 100 to 140; (2) heavy work — pulse rate 140 to 180, and (3) severe work — pulse rate greater than 180 beats/min.

medical news

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

Honor Bestowed on Jerome S. Tobis



Jerome S. Tobis, M.D.

Dr. Jerome S. Tobis, Director, Department of Physical Medicine and Rehabilitation, New York Medical College, Flower and Fifth Avenue Hospitals, has been chosen "Physician of the Year in New York State" for furthering employment of the physically handicapped. Announcement of the citation was made by Mr. Orin Lehman, Chairman, New York State Governor's Committee on "Employment of the Physically Handicapped." Dr. Tobis was chosen because of his work in organizing the sheltered workshop at Bird S. Coler Hospital.

This citation is given each year to a physician who has played an important role in the successful rehabilitation of the physically

handicapped, or has made possible the employment of physically handicapped persons on a large scale. The recipient is considered for the national physician's award given by the President's Committee on Employment of the Physically Handicapped. The national award will be made in February, 1958.

Dr. Tobis, a diplomate of the American Board of Physical Medicine and Rehabilitation, is a member of the American Academy of Physical Medicine and Rehabilitation and is currently serving as fourth vice-president of the American Congress of Physical Medicine and Rehabilitation.

New Medical Teaching Films

Stress and the Adaptation Syndrome by Norman P. Schenker, M.D., and Leo L. Leveridge, M.D., in collaboration with Hans Selye, M.D.

Audience and Utilization: Since the concept of stress pertains to all medicine, its intended audience includes all physicians — general practitioners and specialists, interns, residents, and research fellows. This film is useful in the instruction of medical undergraduates, and it is of direct value to students in physiology, biochemistry, pathology and endocrinology. It has been found of interest to nurses, dentists, and veterinarians, and can be used for teaching students in these and other allied fields. The implications of this basic concept to the practice of medicine make this an important film. The clear, visual presentation of medical research methods is fascinating to the busy practitioner who rarely has this kind of opportunity for observation of experimental methods, which are the basis for advances in medical practice.

Supplemental Material: A brief bibliography of pertinent papers is available for distribution to members of the audience.

Film Data: 16 mm., color, sound, 1270 feet, 35 minutes. Released November 1956.

Active Management of Disability in the Aged by Frederic D. Zeman, M.D., and Leo Dobrin, M.D.

Audience and Utilization: This motion picture is of great interest and timeliness for all physicians, whether general practitioners or specialists, since with few exceptions, all are seeing more and more older patients. The

specialist in physical medicine and rehabilitation will find in the film an adaptation and modification of accepted methods to suit the special needs of the aged. To workers in auxiliary fields, nurses, social workers, physical therapists and occupational therapists, as well as to hospital administrators and members of governing boards, this film will bring both inspiration and practical guidance.

Film Data: 16 mm., black and white, sound, 1450 feet, 40 minutes. Released December, 1955.

Information covering the availability of these films may be had by writing Leo L. Leveridge, M.D., Director, Medical Film Department, Pfizer Laboratories, 630 Flushing Ave., Brooklyn 6, N. Y.

In Memoriam

Dr. Louis P. Biro, Santa Monica, Calif. — died 1957.

Dr. William T. Johnson, Swarthmore, Pa. — died 1951.

Dr. Theresa U. Lenthall, Parma, Ohio — died July 4, 1957.

Dr. William Grant Lewi, Santa Monica, Calif. — died 1957.

Samuel A. Warshaw, Brooklyn, N. Y. — died April 27, 1957.

Notice of Meeting

The Pennsylvania Academy of Physical Medicine and Rehabilitation will meet on Saturday, October 26, 1957, at the VA Hospital, Pleasant Valley Blvd., Altoona, Pa. All communications relative to this meeting should be addressed to the secretary-treasurer, J. Murl Johnston, M.D., 694 Washington Rd., Pittsburgh 28.

Veterans Administration Career Residency Program

The Veterans Administration offers to selected physicians an opportunity to obtain formal residency training while receiving full pay and other benefits of a staff physician by means of the career residency program. Residency training under the career resident plan is given at certain designated hospitals in the specialties of Anesthesiology, Neurology, Pathology, Physical Medicine and Rehabilitation, Psychiatry and Radiology. The training is the same for career residents as for regular (non-career) residents; the difference between the two programs being the salary and the terms of employment.

Career residents receive the salary, annual and sick leave, promotion, retirement security, Government Life Insurance coverage, and other benefits of a full-time staff physician in the Department of Medicine and Surgery of the Veterans Administration. These benefits begin to accrue for the career resident from the day of his appointment. This means that even during the training period the career resident not only enjoys a higher salary but is creating additional personal security since all of his service counts toward retirement. Career residents receive promotions in the same manner and at the same rate as other full-time Department of Medicine and Surgery physicians, except that promotion to the two top grades in the VA (Senior or Chief Grade) is not permitted while in training status. Annual leave accrues at the rate of 30 days per year; sick leave accrues at the rate of 15 days per year.

Career residents are appointed at the grade and salary for which they are qualified, which may be Junior Grade \$5,915; Associate Grade \$6,390; Full Grade \$7,570; or Intermediate Grade \$8,990. Grade and salary are determined by a Professional Standards Board at the hospital where application is made. In-grade pay increases occur periodically. To be appointed as a career resident the applicant must (1) be an American citizen, (2) be a graduate of an approved medical school, (3) have served an approved internship, (4) must not have reached his 47th birthday at the time he begins training under the contract, and (5) must not be certified in any specialty. Prior service in the Veterans Administration or the military services is not required.

In consideration of the privileges and benefits involved, the physician at the time of appointment to career resident status, enters into an agreement by formal contract to perform a period of obligated service, the duration of which is in proportion to the length of formal residency training received under the contract. By the terms of this contract the physician agrees to remain in the employ of the VA as a staff physician for a period of time after formal residency training is completed. The contract is flexible in that if the physician receives three years of training under the contract he owes the VA 24 months obligated service; if he receives two years training he is obligated to 18 months; if he receives 12 months training he is liable for 12 months obligated service. This is applicable in all programs except Pathology which requires a year of service for each year of training received. According to the needs of the service the Veterans Administration decides to which hospital the career resident will be assigned for obligated service. The physician is appointed to that hospital which has the greatest need for a specialist in his category at the time training is completed. Career residents should not anticipate assignment for obligated service at the hospital where their

training is received, since a hospital sufficiently well staffed to give training would not be in a position of greatest need when compared to other hospitals in the VA. Career residents are assured that regardless of the location of the assignment for obligated service, they will practice the specialty in which they were trained under the contract. Movement of the physician and household goods from the training hospital to the hospital of obligated service is at Government expense. Upon completion of formal training and obligated service under the contract, the physician is encouraged but not required to remain in the employ of the Veterans Administration. His permanent station may therefore be determined by personal negotiations to meet VA needs in the same or other hospitals.

Only a small number of positions are being offered in Anesthesiology, Pathology, and Radiology. A larger number of positions are available in Neurology, Psychiatry, and Physical Medicine and Rehabilitation. Applicants must be acceptable to the Deans Committee or Medical Advisory Committee which supervises the training program in the VA hospitals in which training is given. A personal interview is usually required since it is imperative that the applicant be fully aware of the provisions and requirements of the contract before he signs it. Lists of VA hospitals approved in the various specialties are shown in the Internship and Residency Number (September 22, 1956) of the Journal of the American Medical Association.

Physicians interested in a career residency in Physical Medicine and Rehabilitation may address a letter of inquiry either to the Chief Medical Director, Attn: Assistant Chief Medical Director for Planning, or directly to the Manager of any VA hospital which has a three-year approved residency in Physical Medicine and Rehabilitation.

Books Received

Books received are acknowledged in this column as full return for the courtesy of the senders. Reviews will be published in future issues of the journal. Books listed are not available for lending.

J.A.M.A. Clinical Abstracts of Diagnosis and Treatment by I. Phillips Frohman; *Physikalische Therapie* by Josef Kowarschik; *Rehabilitation in England* by W. Rusken and P. Kerschbaum; *Clinical Physiology: The Functional Pathology of Disease* edited by Arthur Grollman; *Atlas of Neuro-pathology* by Nathan Malamud; *Therapeutic Exercises for the Treatment of the Neurologically Disabled* by Harold J. Brenner; *Surgeons All* by Harvey Graham; *When Doctors Meet Reporters* compiled by Hillier Kriegbaum; *Foot Troubles* by T. T. Stamm; *Clinical Orthopaedics. No. 9. The Patho-*

logical Physiology of Metabolic Bone Disorders edited by Anthony F. De Palma; *An Introduction to Electromyography* by Fritz Buchthal; *Heidende Wärme* by Hans-Dieter Hentschel, et al; *Isotopen-Fibel Furden Arzt* by Walter Beier and Erich Dorner.

Recent Publications by Members

George D. Wilson, "Proteins in Muscular Dystrophy," *Southern Medical Journal*, April, 1957.

Donald A. Covalt, and co-authors, "Spinal Cord Injury — Rehabilitation Costs and Results and Follow-up in Thirty-one Cases." *The Journal of the American Medical Association*, August 3, 1957.

Odon F. von Werssowetz, "Analysis of Functional Bracing of the Hand." *The American Journal of Occupational Therapy*, July-August, 1957.

Milton Lowenthal, "Experience in Physical Medicine and Rehabilitation on a Home Care Program." *Journal of Chronic Diseases*, August, 1957.

Rex O. McMorris, "Office Practice of Physical Medicine and Rehabilitation." *The Journal of the Kentucky State Medical Association*, July, 1957.

Y. T. Oester, Arthur A. Rodriguez, and co-author, "Electromyographic Findings in Dermatomyositis." *A.M.A. Archives of Dermatology*, July, 1957.

We Are Sorry . . .

. . . that we omitted the name of William D. Paul, M.D., W113 Children's Hospital Iowa City, Iowa, from the Congress membership roster published in the March, 1957 issue of the *Archives*.

Newly Registered Therapists

July 31, 1957

Slater, Marilyn Ann, 38 Park Ave., Yonkers, N. Y.

August 8, 1957

Beemsterboer, Doris J., Box 418, Gurnee, Ill.
Burke, Margaret M., 5324 Washburn Ave., S., Minneapolis

Cardone, Philomena M., 399 Littleton Ave., Newark, N. J.

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August 12, 1957

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August 23, 1957

Anderson, Carole G., 1089 Fairmount Ave., St. Paul
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 Marshall, Richard M., 613 Keokuk Ct., Iowa City
 Nelson, Anna K., Rt. 5, Brainerd, Minn.
 Shambaugh, Katharine M., 342 E. 65th St., New York City

**"Power of Positive Pressure":
 New Film Strip**

Depicted are the various simplified methods of giving artificial respiration to poliomyelitis patients with respiratory failure. The principle of positive pressure is employed in all of the commonly used devices with the exception of the rocking bed. The following devices together with their clinical uses are described: intermittent positive pressure, hand bellows, positive pressure mouth stick and new cough device. The increase in range of rehabilitation made possible by these devices is demonstrated by scenes taken on the ward showing poliomyelitis patients with total respiratory failure, who are able to walk, talk, eat, and to do activities of daily living in comparative comfort.

The film may be secured for viewing purposes by writing direct to William D. Loesser, M.D., Medical Director, Respiratory and Rehabilitation Center, Chronic Disease Research Institute, 2183 Main St., Buffalo 14, N. Y.

**Burdick Celebrates 45th Anniversary
 with New Building**

The Burdick Corporation of Milton, Wis. has recently completed a \$200,000.00 building which coincides with their observance of 45 years of progress.

The new building, housing offices and the engineering department, is a concrete testimony to their progress, since their expansion has made it a real necessity. As they grew, more production space and more engineering space was needed.

When F. F. Burdick, founder of the firm, and F. A. Anderson, President and General Manager, joined forces many years ago to manufacture equipment in the field of physical medicine, the industry was then in its infancy. Very little equipment was available and what there was proved to be relatively inefficient mainly due to the fact that knowledge on the subject was so meager.

With 45 years of past experience behind them, Burdick is eagerly looking forward to continued advancement in the field of physical medicine.

New Literature On Dysautonomia

"Living With a Child With Familial Dysautonomia" by Conrad M. Riley, M.D., has just been published by the Dysautonomia Association, Inc. Dr. Riley is Associate Attending Pediatrician at Presbyterian Hospital in New York and copies of the booklet may be obtained through him at Babies Hospital, Broadway & 168th Street, New York City.

Familial Dysautonomia, also known as familial autonomic dysfunction and the Riley-Day syndrome, is a condition which was first described in the medical literature in 1949 though it almost certainly is not new. The booklet is a guide to parents of children born with dysautonomia, and it includes much information that has not been available to physicians.

Dysautonomia is a diffuse malfunctioning of the central nervous system which most severely affects areas which control the autonomic nervous system. Lack of tears is the most distinctive identifying feature.

New Rehabilitation Film Now Available

"Child Care Problems of Physically Handicapped Mothers"

This 16 mm. thirty-minute, sound, color film was designed primarily to orient professional personnel and lay audiences to the problems handicapped homemakers face in caring for young children. In a very sensitive manner it presents some of the difficulties with which they are confronted and how various tasks are handled. The narration suggests ways in which the practices could be improved.

The film was made in eight different homes and includes: one normal mother, three wheelchair mothers, one amputee, one with muscular weakness, one using a crutch and one with leg braces. It points up to the need to expand rehabilitation programs to include more of the 10,000,000 handicapped homemakers in the United States.

It may be borrowed for a fee of \$1.00 to cover handling charges. Prepayment is requested in order to avoid bookkeeping costs. Purchase price will be sent on request. Address inquiries for borrowing or purchase to Audio Visual Center, University of Connecticut, Storrs, Conn.

Brain Injection Helps Cerebral Palsy Victims

Cerebral palsy victims may be helped by a new brain operation that relieves their involuntary muscular movements. The surgical technic, called chemopallidectomy, involves an injection of chemicals deep into the brain and has been used in the past to help adult victims of Parkinson's disease.

Out of 30 children who have had the surgery, 20 of them were either cured of their involuntary movements or were noticeably helped, Dr. Irving S. Cooper, New York University-Bellevue Medical Center, New York, reports in the *Journal of the American Medical Association* (July 20).

The chemicals are injected into the region of the globus pallidus, in the lower middle part of the brain. They destroy tissue which is believed to cause the abnormal stimulation of the muscles.

But the value of the treatment lies in the fact that both sensation and the ability to move are not lost along with the involuntary movements.

Why the operation helps to relieve the tremor, rigidity and involuntary motion is not known and requires much more study, Dr. Cooper reports.

He emphasizes that the treatment was only helpful in eliminating the involuntary movements of cerebral palsy. Other abnormalities frequently found with them, such as paralysis, are not helped by the surgery.

Condensed Version of Workmen's Compensation Cases

One of the most pressing problems for plant safety personnel, attorneys, insurance companies, and other persons and companies concerned with industrial compensation claims, has been the lack of compiled information on past cases involving such accidents.

To satisfy this long standing need, a 491-page book detailing each of 565 industrial compensation decisions has been published by Occupational Hazards Magazine, Cleveland, a magazine devoted to industrial safety.

According to Edwin M. Joseph, magazine publishing director, "the book, the first of its kind ever published, presents a condensed version of workmen's compensation cases, completely cross-indexed for easy reference.

"It was our aim in publishing the collection of cases to provide a means of comparison with the cases which occur daily in plants all over America. In this way, safety directors, personnel managers and others connected with workmen's compensation can use the decisions published as a probable guide to the solution of their own cases."

The book is conveniently divided into nine sections for ease of reference. Such sections include Accidents Arising Out of Employment, Misconduct By The Worker Or His Employer, Accident, Employment Status, Course of Employment — The Employee's Activity, and others.

The detailed index enables quick comparison of all pertinent decisions according to specific injuries or situations under which the injuries occurred. In addition, the legal reference is given for each case including the complete name of the case, the court in which it was tried, the date, and the legal reference number.

Copies of the book may be obtained from Occupational Hazards Magazine, 812 Huron Road, Cleveland 15, Ohio. Cost is \$12.50 per copy.

OT Anniversary

The American Occupational Therapy Association celebrates its fortieth anniversary with the Annual National Institute-Conference to be held October 21-25, at Hotel Carter, Cleveland, Ohio. Occupational therapists from all over the United States will attend and take part in the program.

The general plan is to follow an institute-workshop type of meeting, with opportunity for all people attending to take part in small group discussions. Emphasis will be placed on group techniques and the occupational therapist's role in the therapeutic situation. A panel, consisting of representatives from several allied professions as well as occupational therapy will discuss the evaluation of the patient.

UV and AI

Asiatic influenza that, for the first time, recently hit the United States is the subject of a study by the Veterans Administration to determine whether ultra-violet light can help prevent its spread.

The pilot project is functioning at the VA hospital in Livermore, Calif., core of the area where the disease first was noted in the United States. The Livermore hospital is one of the few in the nation that is equipped with ultra-violet lights.

Dr. Ross McLean, director of professional services at the VA hospital in Baltimore, Md.,

is on temporary duty at Livermore as coordinator for the study. The research will be carried out by Dr. Harrison S. Collisi, manager of the Livermore hospital, and his staff. Dr. McLean said the primary aim of the project is to learn the value of irradiating indoor areas with ultra-violet light as a protection against influenza. "We are particularly interested in determining if the Asiatic influenza virus is airborne and, if so, the effect of ultra-violet irradiation on airborne virus," he said.

To aid the nation in fighting Asiatic flu, the entire staff of the Livermore VA hospital has volunteered to undergo a series of tests under a VA-Public Health Service research study.

VA doctors and technicians have begun taking blood samples from the more than 500 employees. The samples will be sent to the United States Public Health Service communicable disease center serological laboratories to determine which employees have been attacked by the influenza virus and have built up immunity to the disease. Manager of the Livermore hospital said information provided by the blood tests will be used with a VA study of how Asiatic influenza is transmitted particularly whether it is airborne or spread by direct contact. Findings from the study may make possible new methods of controlling influenza in future epidemics.

Dr. Elmer Hess

Heads Selective Service Committee

Dr. Elmer Hess, Erie, Pa., recent president of the American Medical Association, has been appointed by President Eisenhower as chairman of the National Advisory Committee to Selective Service on the Selection of Physicians, Dentists and Allied Specialists. He succeeds Dr. Howard Rusk, of New York City, who has held the post since the committee's formation in 1950, when the doctor draft went into effect. The committee advises on the induction of medical and dental officers in the armed services. Dr. Hess served in the Army Medical Corps in World War I in France. He has made several missions abroad for the government.

Ethical or Unethical?

Among the compilation of questions and answers on matters of ethics which has been prepared by the Judicial Council of the AMA appears the following:

Question: Is it ethical for a physician to indicate on his letter or billhead, or his professional cards, that he is a member or fellow or diplomate of some specialty organization within the medical profession?

Answer: The physician should limit the use of statements of qualifications and honors on letter and billheads and professional cards to the simple, dignified abbreviation, "M.D.," or the statement "Doctor of Medicine." To do more smacks of self-laudation, borders on solicitation of patients, and tends to reduce the degree and title "Doctor of Medicine" to secondary importance. While it cannot be concluded that it is unethical to use specialty designations in this manner, it can be said that the practice is not in the best of taste or in the best interest of the profession.

Potential of the Mentally Retarded

Mentally retarded adults can gain confidence necessary to take over simple jobs in industry as a result of a new concept of therapy. The new theory, developed at Illinois Institute of Technology's Institute of Design, has enabled 30 mentally retarded adults to become more aware of their potential.

Submitted to a set of non-verbal experiences, the adults have been made more aware of themselves through an investigation of space, according to John Waddell, head of art education at the design institute. Art education students spent an average of two hours a week with each retarded student. The four-month project was conducted at the Retarded Adult Training Center at Hull House. Experiments consisted of orienting the self in space by following one's steps across a room with yarn, for example, or making plaster castings of the movements of one's hand in sand. A new kind of self-awareness was aroused in these people, whose IQ's ranged from 20 to 70. An IQ of 100 is considered normal. This thought activity, or space conception, at the visual (non-verbal) level, Waddell said, proved more successful than the usual treatments — play, finger painting, drawing, music.

"The activities we presented to the students challenged them to the utmost of their capacities," he pointed out, "and were not associated in their minds with unsuccessful childhood experiences." These adults, stresses Waddell, are not mentally ill, but have a mental deficiency often acquired before or during birth.

VA to Accept Student OT's

Veterans Administration announced it will accept an increasing number of students for clinical training in occupational therapy, under the Physical Medicine and Rehabilitation Service, to help alleviate the national shortage in this field. VA has been training about 300 occupational therapy students at 17 hospitals each year.

Admission of additional trainees to the hospital programs on a "without compensation" basis will enable VA to comply with recent requests from schools of occupational therapy for affiliation with the hospitals. These students will receive quarters and subsistence in return for their services but will not receive a stipend. Occupational therapy training in VA hospitals offers clinical experience in a variety of disease and disability categories.

Muscular Dystrophy Abstract Booklet

Muscular Dystrophy Associations of America, Inc., has announced a new service, the publication of a series of monthly muscular dystrophy abstracts for research scientists and others interested in muscular dystrophy and related diseases. The project is being carried out with a subsidy from the association by the Excerpta Medica Foundation of New York and Amsterdam, Holland, for distribution throughout the world. The first booklet presents summaries of 59 recent papers by scientists in this country and abroad. The papers are classified into two groups: abstracts from the clinician, concerned mainly with general anatomo-clinical publications, and abstracts of articles concerning the basic sciences relating to muscular dystrophy. The abstracts are sent to association research grantees and clinic workers and other professional individuals and institutions. The abstracts were published under the general editorship of the association's Medical Advisory Board. For information write the Muscular Dystrophy Associations of America, Inc., 1790 Broadway, New York City 19.

Fraternity Hazing Causes Illness

Fraternity hazing of college students at Ohio State University brought on an illness characterized by tense muscles and coffee-colored urine, Dr. William C. Stahl, Columbus, Ohio, reports in the *Journal of the American Medical Association* (July 27).

The illness is caused by over strenuous exercise and has been named "exercise myohemoglobinuria." The probable cause is a breakdown of muscle fibers due to extreme exercise, with the result that hemoglobin is released into the blood stream and then through the kidneys.

The first recognized case was a student who had been compelled by his active fraternity brothers to get out of bed three times during the night and each time for 30 to 45 minutes to do push-ups, knee-bends and other exercises. He was hospitalized as soon as he reported to the University health service about

60 hours later, because his symptoms resembled that of a serious kidney disease.

The condition also occurred in two students who developed it after doing more than 150 knee-bends "for fun to see who could do the most."

Another student developed it after doing about 200 push-ups in an hour to "get into condition."

The illness resembles "march hemoglobinuria" which occurs after marching or strenuous walking or running. This was first known in 1881 but was always associated with exercising in an erect posture. Only 75 cases of it have ever been reported. The Ohio State students, however, were doing non-erect exercises, Dr. Stahl reports.

Recovery was spontaneous and the treatment included bed rest if the student wanted it, aspirin for the muscular pains, and the prohibition of additional exercises.

Fatal Blood Clots Can Be Dissolved

A drug that may stop heart attacks by dissolving dangerous blood clots after they form in the body is now being tested in humans, Yale University scientists have reported.

The drug is an enzyme known as plasmin. It will be injected into the blood stream as soon as a blood clot is detected. If it works as well in humans as it has in experimental animals, the clot will dissolve and the blood will return to normal within a few hours.

Although anticoagulant drugs to help prevent the formation of clots are already in use for heart patients, there is nothing now available that can be used to dissolve the clots once they are formed. These clots travel throughout the blood stream and cut off vitally needed blood flow in arteries and veins.

The plasmin enzyme is obtained from the reaction between two other enzymes, plasminogen and streptokinase. Plasminogen is an inactive enzyme extracted from human blood which was provided by the American Red Cross, while the streptokinase is obtained from streptococcal bacteria and contains poisonous materials which lower blood pressure, restrict blood supply to the heart and has been found to cause chills and fever.

The big problem in the past has been to get plasmin pure enough so that it was non-toxic to humans.

Although it has not yet been completely purified, Drs. Daniel L. Kline and Jacob B. Fishman, Yale School of Medicine, believe they have removed enough of the toxins to try it in humans.

Other scientists are working on ways to inject the streptokinase directly into the blood stream so that it can react with the plasminogen normally in the blood, thus releasing plasmin inside the body.

This method would not work in all cases

because some people may be deficient in plasminogen, Dr. Kline said.

Also, about one out of three persons has developed antibodies against streptokinase because of previous streptococcus infections, he added.

Personals

Robert L. Bennett, Warm Springs, Georgia; **Jessie Wright**, Pittsburgh; **Herman J. Bearzy**, Dayton; and **Sedgwick Mead**, Vallejo, California, attended the International Poliomyelitis Conference held at Geneva, Switzerland as representatives of the American Congress of Physical Medicine and Rehabilitation. These delegates were appointed by the Congress President, **A. B. C. Knudson**, of Washington, D. C. — **Lewis Cohen**, Detroit, presented the papers, "Physical Medicine and Rehabilitation in the General Hospital" to the Blue Water Chapter of the Michigan Academy of General Practice, and "Electrovasography in the Study of Peripheral Vascular Dynamics" to the National Biophysics Conference earlier this year. The scientific exhibit, "Electrovasography: Quantitative Diagnosis in Vascular Disorders," was also presented by Dr. Cohen at the annual meeting of the American Medical Association in June. His exhibit was awarded a Certificate of Merit in the Physical Medicine section. — The newly created Department of Physical Medicine and Rehabilitation at the Long Island College Hospital is under the direction of **S. G. Feuer** of Brooklyn. — Recent publications by **Ferdinand F. Schwartz**, Birmingham, Alabama, include "Quo Vadis Oh Hominis" in *Medical Times* and "Physical Medicine and Rehabilitation in Arthritis" in *Procedure of the International Congress of Physical Medicine, Copenhagen, Denmark, 1956*. Dr. Schwartz has addressed the Guatemala Physical Therapy Association at Guatemala City, Central America, on Ultrasonics; the General Hospital staff of Barranquilla, Colombia, South America, on Shoulder Pain and Treatment; the Academy of General Practice of the state of Alabama on Shoulder Pathology; and the Five Points West, Sertoma Club of Birmingham, on Chronic Illness. — The Ohio State Chapter of the American Physical Therapy Association held its annual convention in April with **Leo Rosenberg**, Dayton; **Herman J. Bearzy**, Dayton; and **Donald A. Covalt**, New York City, participating in the program. Their topics included Geriatrics, Muscular Dystrophy, and Chronic Diseases Regarding Rehabilitation respectively. — The Medical Advisory Committee of the United Cerebral Palsy Association of Chicago met last year to report on the Subcommittee on Policies Regarding Medical Referrals. The subcommittee's assignment was to recommend policies and procedures for

UCPA staff activities relating to requests for referrals to physicians and clinics by parents of cerebral palsied children, by other lay persons, and by physicians, social agencies, and other professional persons. **David Abramson**, **Ben Boynton**, **Arthur W. Fleming**, and **Joseph L. Koczur**, all of Chicago, are members of this Advisory Committee. — In a report prepared for the annual meeting of the American Society of Surgery of the Hand, **Earl C. Elkins**, Rochester, Minn., described tendon transfer operations which have restored the use of hands and fingers resulting from paralysis from broken necks. He described nine such operations performed at the Mayo Clinic in the past two years. — The Chicago Society of Physical Medicine and Rehabilitation elected as President, **Ray Piskowski**, Milwaukee; Vice President, **Y. T. Oester**, Chicago; Secretary-Treasurer, **Robert W. Boyle**, Wauwatosa, Wis.; and to the Board of Trustees, **Ralph DeForest** of Chicago for the current year. — "Peripheral Blood Flow" was the subject **Harry M. Hines** chose for the third annual Albert Kuntz Lecture sponsored by the Phi Chi Medical Fraternity when he delivered the address at the meeting of the St. Louis Medical Society. Dr. Hines is professor of physiology and director of the department at the State University of Iowa. — **Herbert Kent** of Oklahoma City attended the physician's course on above-knee amputations held at the University of California Medical Center at Los Angeles late in April of this year. In addition, he presented a paper on "Physical Medicine and Rehabilitation of Rheumatic Disease in Oklahoma" at the Oklahoma Rheumatism Society meeting held in Tulsa. — The physiatrists of the state of Michigan have organized the Michigan Academy of Physical Medicine and Rehabilitation incorporated under the laws of the state. Its objects are to promote the science and art of medicine and the betterment of public health through an understanding and utilization of the functions and procedures of physical medicine and rehabilitation. Officers elected by the group include President, **Max K. Newman** of Detroit; Vice-President, **James W. Rae** of Ann Arbor; Secretary-Treasurer, **Frederic B. House** of Ann Arbor; and Trustees **George Koepke** of Ann Arbor, **Robert C. Dean** of Detroit, and **William C. Schaeffer** of Detroit. The registered office of the Academy has been designated as the University Hospital, Ann Arbor, Michigan. — **Sedgwick Mead**, Medical Director of the California Rehabilitation Center at Vallejo, participated in a postgraduate course on Geriatric Medicine with special emphasis on heart disease conducted by the Washington University School of Medicine at St. Louis. His subject was "Physical Rehabilitation of the Elderly Person." — The chairman of the Department of

Physical Medicine and Rehabilitation and Medical Director of Rehabilitation Center, Inc., **Rex O. McMorris**, has been appointed as a permanent faculty member of the Institute for Rehabilitation Center Planning, which is under the auspices of the Office of Vocational Rehabilitation and the Conference on Rehabilitation Centers. — **Paul A. Nelson**, Cleveland, discussed "Rehabilitation of the Hemiplegic Patient" at the September meeting of the Ohio Academy of General Practice. — **George D. Wilson**, Asheville, N. C., has been appointed Councilor, representing the State of North Carolina on the Council of the Southern Medical Association for a term of five years. — **Michael M. Dacus**, New York City, has recently received the following appointments: Special Consultant, United States Public Health Service, Bureau of State Services, Division of Special Health Services, Chronic Disease Branch; Member, National Advisory Committee on Chronic Disease and Health of the Aged, and member, Executive Committee, National Conference on Social Welfare. — **Frederic J. Kottke**, Minneapolis, has been appointed for a third three-year term on the Minnesota physical therapy committee; he was also a speaker at a recent meeting of the Southwestern Minnesota Medical Society.



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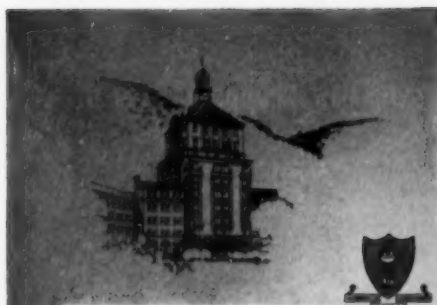


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For further information contact:

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Medical Director

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The Sister Elizabeth Kenny Foundation announces a continuance of its post doctoral scholarships to promote work in the field of neuromuscular diseases. These scholarships are designed for scientists at or near the end of their fellowship training in either basic or clinical fields concerned with the broad problem of neuromuscular diseases.

Kenny Foundation Scholars will be appointed annually. Each grant provides a stipend of from \$5000 to \$7000 a year for a five-year period, depending upon the scholar's qualifications. Candidates from medical schools in the United States and Canada are eligible.

Inquiries concerning details should be sent without delay to Dr. E. J. Huenekens, Medical Director, Sister Elizabeth Kenny Foundation, 2400 Foshay Tower, Minneapolis 2, Minn.

IMPORTANT ANNOUNCEMENT

American Board of Physical Medicine and Rehabilitation

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Peoria, Ill., June 20 and 21, 1958. The final date for filing applications is March 1, 1958. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Earl C. Elkins, 200 First St., S. W., Rochester, Minn.

Continuation Course in Physical Medicine

The University of Minnesota, with the generous support of the Sister Elizabeth Kenny Foundation, will present a continuation course in Physical Medicine for Specialists at the Center for Continuation Study, November 18 to 20, 1958. The program will deal with the evaluation and management of cerebral palsy.

The faculty will include several widely known authorities in this field. The program will be presented under the direction of Dr. Frederic J. Kottke, Professor and Head, Department of Physical Medicine and Rehabilitation.

Lodging and meal accommodations are available at the Center for Continuation Study.



The funny hole in Mr. Cooper's building

MANY a New Yorker shook his head, and not a few snickered, when they saw the "hole" in Peter Cooper's new building.

But to the benign gentleman with the ruff of graying whiskers it was all so simple: Some day someone would perfect the passenger elevator.

The mere fact that there wasn't one in 1853 would mean little to a man who, with his own hands, had built and driven the first American locomotive. Whose money, and faith, were to help see the Atlantic Cable through all its disasters to final success. And who would "scheme out" a Panama Canal plan fourteen years before DeLesseps.

But Peter Cooper's belief in the future ran in a vein far deeper than simply the material. For his "building with a hole" was Cooper Union, the first privately-endowed tuition-free college in America. A place where young men and women of any race, faith, or political opinion could enjoy the education which he, himself, had been denied. Peter Cooper's dearest dream



—which has continued to grow dynamically for nearly a century and today enriches America with thousands of creative thinkers, artists, and engineers.

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Many factors contribute to this success — your leadership, a more aware public, improved methods and techniques of detection, diagnosis and treatment. There is every reason to expect this progress to continue to the point where half of those stricken by cancer will be saved. As yet, science does not have the know-how to save the other half.

That knowledge will be gained — and, indeed, the riddle of cancer itself, will one day be solved in the research laboratories. To continue to support this vital work, as well as to carry on its dynamic education and service programs, the American Cancer Society is seeking \$30,000,000. We are again appealing to the public to “fight cancer with a checkup and a check.”

The check is insurance for tomorrow. The insurance for today is largely in your hands, doctor. Fighting cancer with a checkup is our *immediate* hope for saving lives.

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